PLASTICS

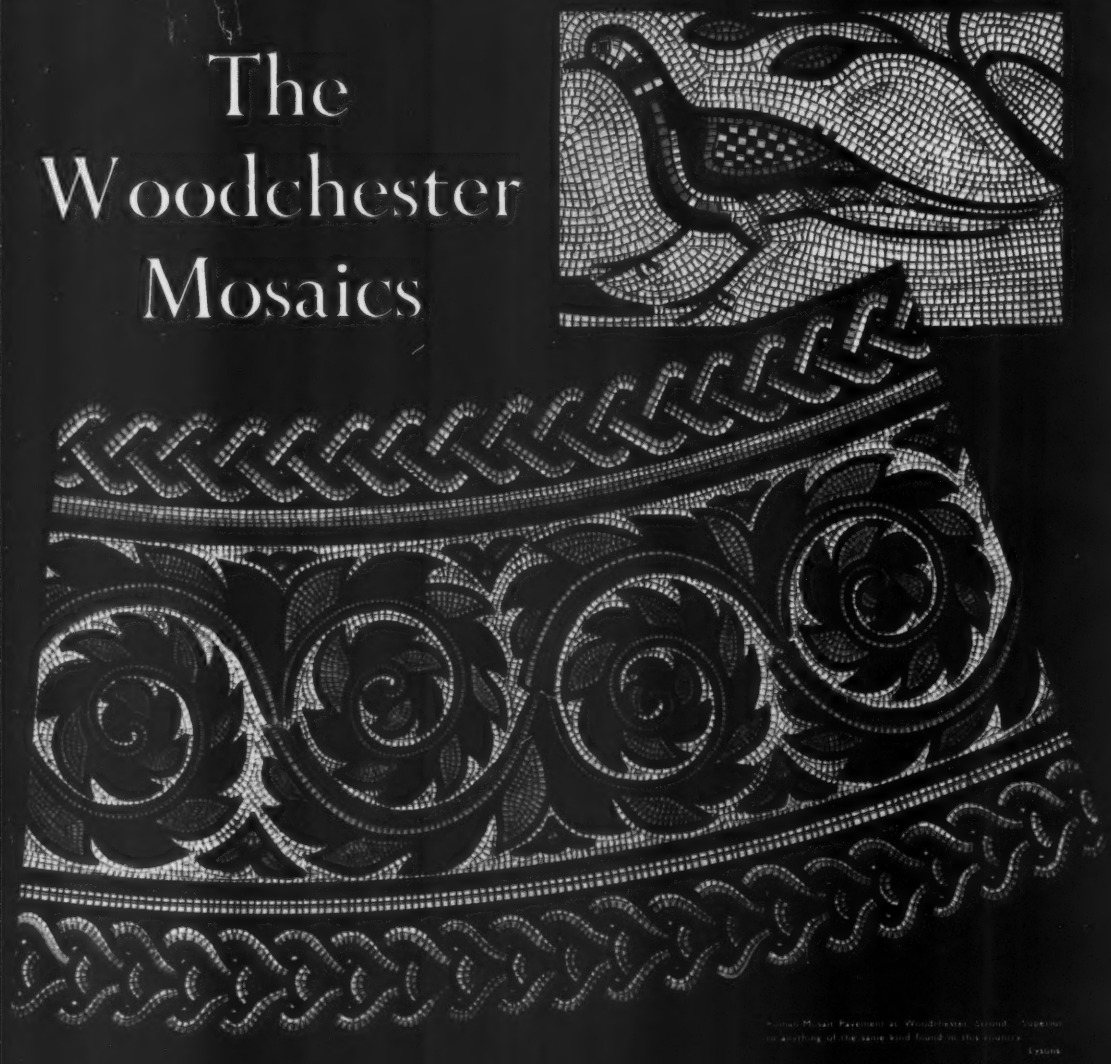
DEALING WITH THE MANUFACTURE, USES AND POTENTIALITIES OF PLASTIC MATERIALS

...products illustrated ...manufactured by ...urn, Fitzgibbon & ...rney, Ltd.

LACTOID *for quality*

BX PLASTICS LTD., London, E.4. ***Telephone:*** **LARkswood 4491**

The Woodchester Mosaics



symbolize the skill and fine materials for which the Stroud Valley is famous —from West of England Cloth

to

Plastics

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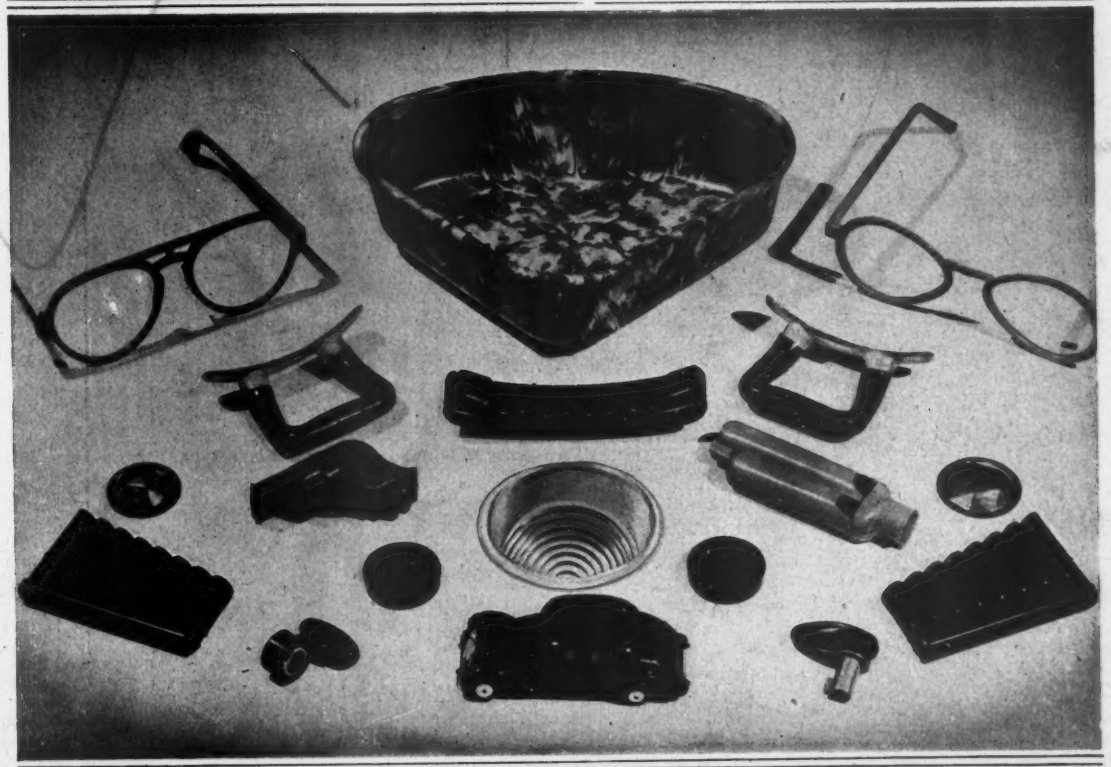
STROUD, GLOS., ENGLAND

MOULDS



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Polyvinyl Acetate

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For the manufacture of washable water paints, industrial and decorative finishes, printing inks and adhesives ; and for use in leather, textile and hosiery finishing, paper converting and packaging, flooring compositions and cosmetics.

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A new series of low melting point compounds have been developed to simplify the production of flexible moulds for the casting of plaster and concrete.

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VP 32

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Polyvinyl Chloride

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V 32

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P.V.C. Insulated

Insulation accurately extruded to ensure concentricity

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CELLOMOLD *moulding materials*

CELLOMOLD COLOUR-RANGE TRIANGLES *numbered for quick, easy reference are available free on request.* *"Cellomold" is a Registered Trade Mark*

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The only Press with all these advantages

SELF-CONTAINED : Fitted with a sealed unit hydraulic system which incorporates a compact and efficient high-pressure pump.

VARIABLE PRESSURE : By means of a handwheel on the pump, pressure can be adjusted between the maximum and minimum force specified for each type of press.

SEALED HYDRAULICS : The hydraulic system is wholly contained in a sealed oil tank, and foreign matter is thus completely excluded.

SIMPLICITY OF CONTROL : A single lever controls both upward and downward movements of the ram.

SIMPLE TO INSTALL : To install the press it is only necessary to make one connection to the electric supply.

EASY TO MAINTAIN.

SAFETY IN OPERATION: Mechanically interlocked safety guards prevent the ram being moved unless guards are completely closed. Electrical switchgear and controls totally enclosed.

Entirely new in design and principle of operation, Turner Plastics Presses represent the greatest advance yet made in the production of presses for compression moulding of plastics, deep drawing and other pressing operations. Each press combines the uses of many by providing a range of variable pressures. The larger type gives any required pressure between 25 and 125 tons, the smaller model any pressure between 10 and 50 tons. They are fully self-contained and incorporate a unique hydraulic system which is completely sealed against dust and dirt, but is easily accessible for inspection and maintenance. Compact in construction, Turner Presses enable the greatest productive use to be made of every foot of factory floor space. Fully descriptive literature gladly sent on request.

TURNER MANUFACTURING COMPANY LIMITED, VILLIERS STREET, WOLVERHAMPTON

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we handle our customers

We've made plastic handles for all manner of things in the past, but we were faced with a really tough proposition in that line just recently. The customer wanted us to design and mould a light, compact saw handle, complete with an inset steel blade holder, and it had to be really strong. Putting our thinking caps on, we produced just what he wanted —a handle weighing only a few ounces, capable of withstanding years of rough usage.

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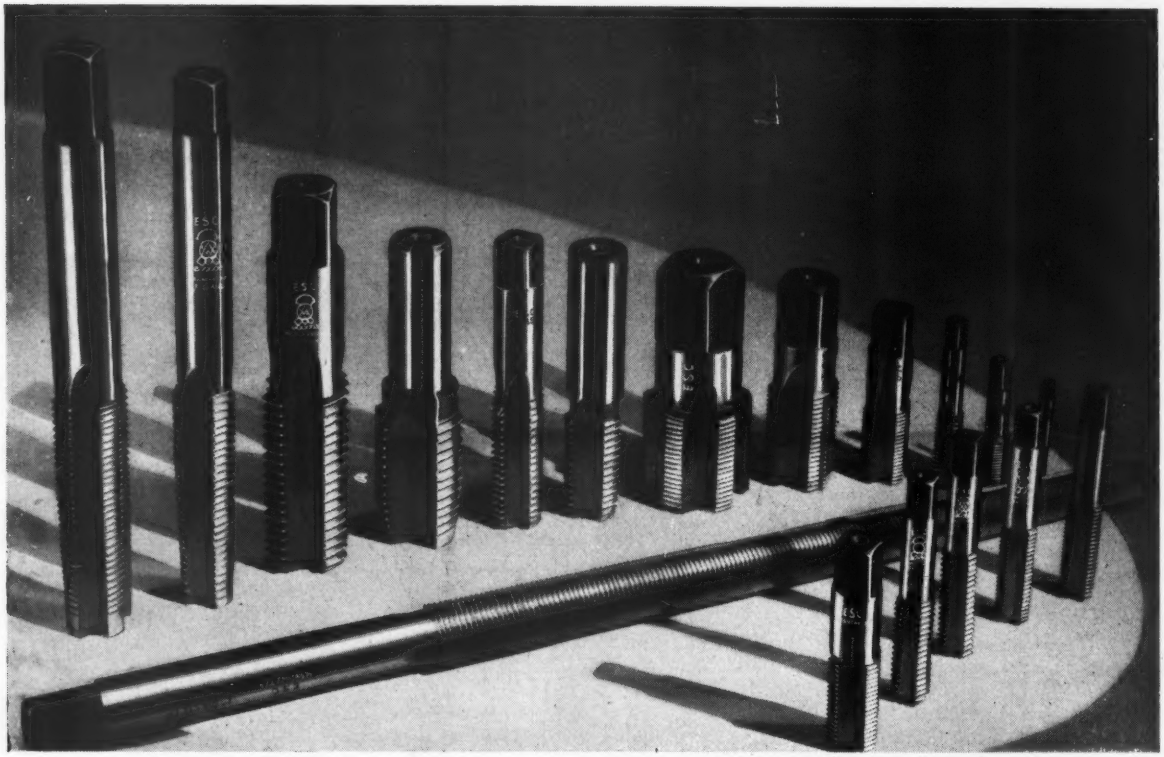

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E.S.C. ground thread taps are proving the right answer to many difficult threading problems the world over. The fact that we also produce the steel from which they are made enables us to exercise careful control over all processes and ensures the production of ground thread taps of the highest quality and workmanship.
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For Precision!

Concentration on precision and thousandth of an inch accuracy have made Fraser & Glass acknowledged leaders in the field of plastic moulding. For over twenty-five years we have been associated with every major technical advance in this expanding industry. Why not find out if moulded plastics can not only lower costs but increase the efficiency of *your* product? Our technical staff would welcome the opportunity to discuss any development problem with you. The address is FRASER & GLASS LTD., WOODSIDE LANE, LONDON, N.12. (HILLSIDE 2224-5).

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Any old polystyrene, P.V.C.,"perspex"scrap and offcuts?

We're particularly interested in buying these, and

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and we give the best possible prices. Incidentally, what

you sell us goes to earn valuable exchange in the export

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The DUMBRILL

"MODEL A" MIXER

For nearly half a century we have specialised in the manufacture of machines for all classes of mixings. The DUMBRILL "MODEL A" Mixer is our latest production. It has already been installed by leading plastics manufacturers. The unique action of the arm operating in the specially designed revolving bowl ensures the complete and rapid amalgamation of the whole of the contents. Continuity of operation is obtained by the use of multiple bowls (as illustrated). Bowls tilt to facilitate speedy discharge of the finished mixings. The simple construction enables the arm and the bowls to be cleaned in the shortest possible time; in fact, with most mixings the machine is virtually self-cleaning. Available in five different sizes to cope with all outputs.

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Ask Crystalate to quote for Your job in Moulded Plastics

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EQUIPMENT

H.P.M. Injection Moulding Machines open up new markets for the plastics moulder. Size and weight are no longer limiting factors. Refrigerator parts, radio cabinets, toilet seats, large instrument housings are typical examples which can now be moulded on a production basis with the new British built H.P.M. equipment. There's a big demand for large plastic parts, are you prepared to make them? Write today for details of the British built H.P.M. range of equipment.

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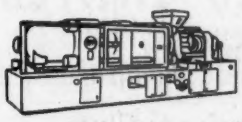
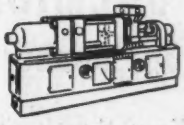
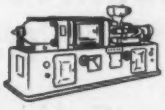


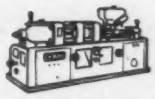
60 ounce



32 ounce



16 ounce



10 ounce

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B1

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* * *

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Our highly qualified technical staff is at your service.

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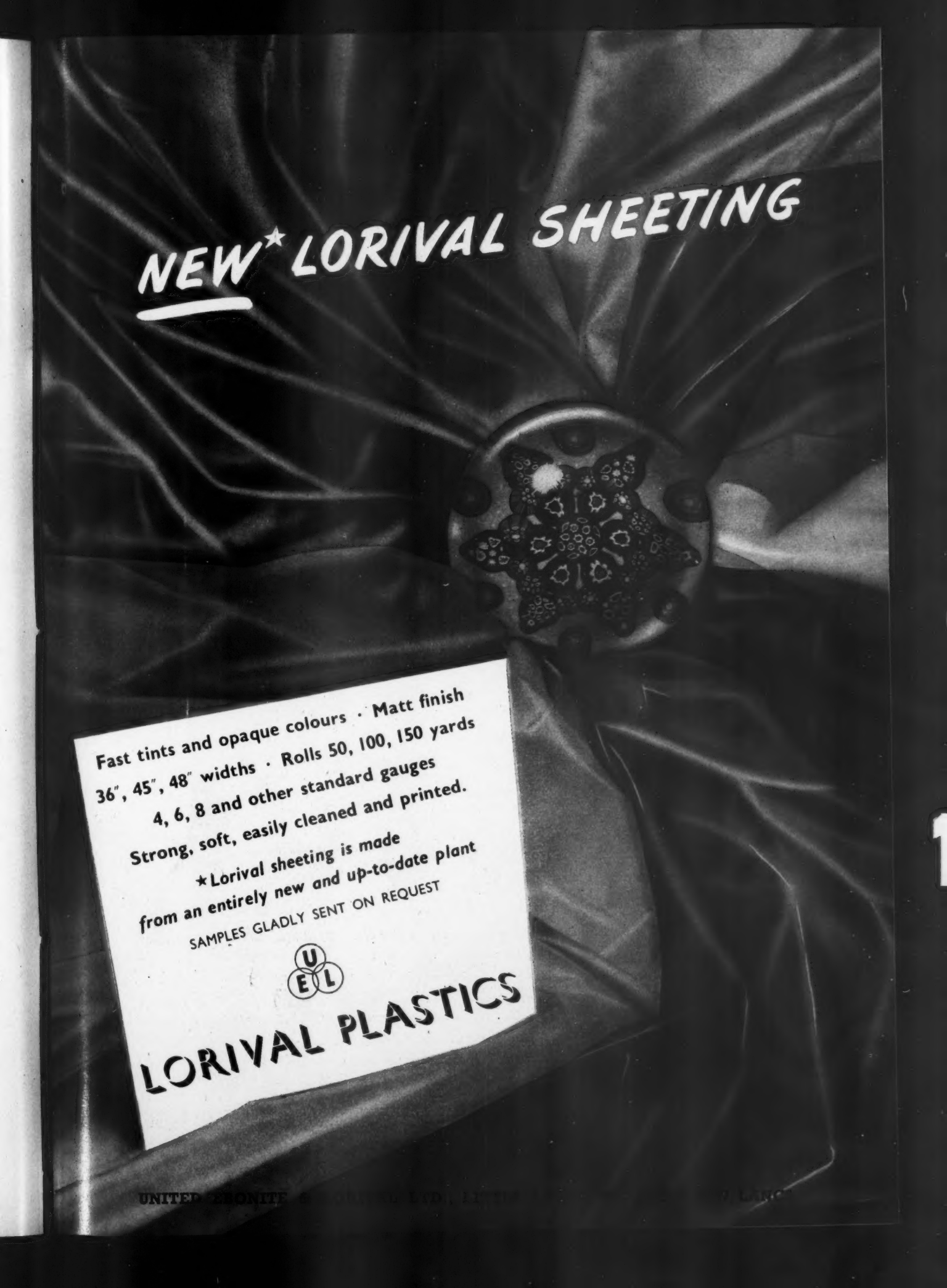
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Strong, soft, easily cleaned and printed.
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SAMPLES GLADLY SENT ON REQUEST
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NOW IN PRODUCTION

AUTO-CONTROL

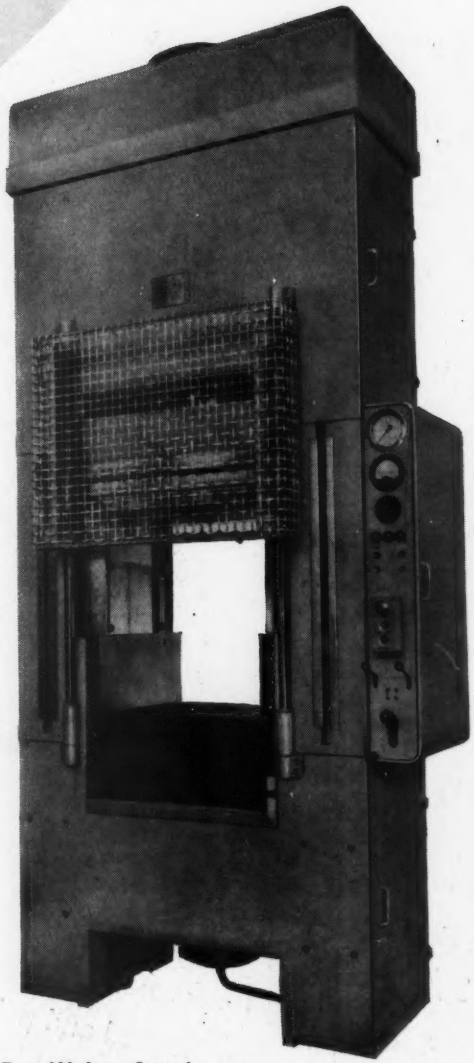
BIPEL

PRESSES

Three moulding presses incorporating automatic control of the moulding cycle with optional transfer moulding rams; designed by moulders for moulders. The prototypes of these presses were designed initially for the moulding division of our own Group and are the result of several years' research on press plant and in particular on the automatic control of the moulding cycle. They have been at work now for over two years producing trade mouldings 24 hours a day, 6 days a week: their performance has convinced us that they are unsurpassed by any press made anywhere in the world.

There are three models:—

Type 40	Pressure range	20 - 60 tons
Type 100	Pressure range	50 - 150 tons
Type 200	Pressure range	100 - 300 tons



Type 100 Auto-Control Bipel Press, fitted transfer ram

BRIEF SPECIFICATIONS

FRAMES: Heavy steel plate, electrically welded, stress relieved, enclosing completely all hydraulic and electrical equipment. Water-cooled platens.

RAMS: Annulus type, hard chromed, fitted with C.I. piston rings.

HYDRAULIC SYSTEM: 1,000-p.s.i. ring main supplied from self-contained unit embodying air-loaded accumulator and special B.I.P. unloading valve *which cannot by-pass fluid under pressure but always unloads.* Working pressures of 2,000 to 3,000-p.s.i. are obtained by intensifier built into press.

AUTOMATIC CONTROL: Pneumatically operated. Can reproduce with precision any moulding cycle that can be performed manually.

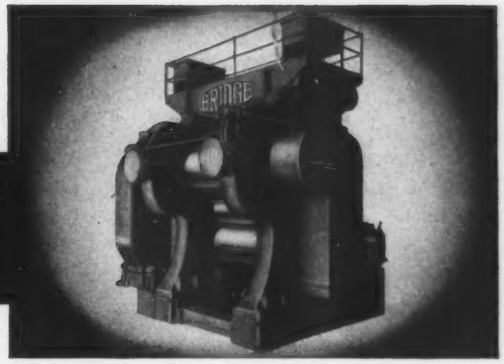
ELECTRICAL GEAR: All built-in including thermostatic control for platens and moulds.

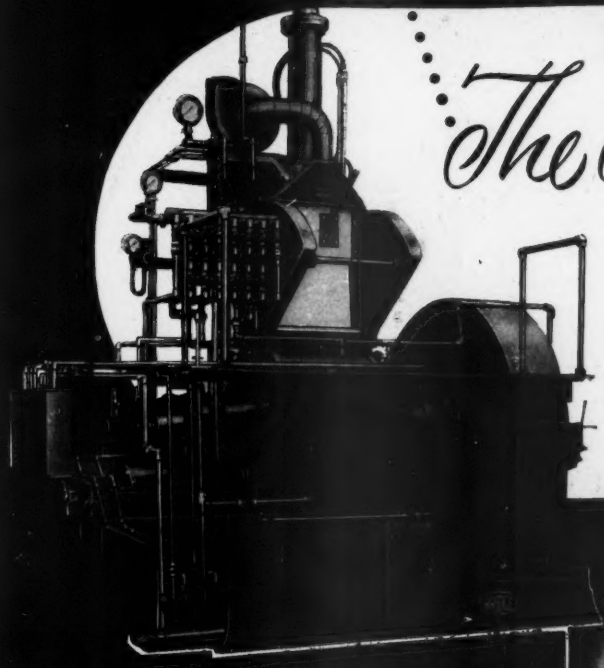
GUARDS AND CHOCKS: Interlocked and automatically operated from sequence controller.

B·I·P GROUP

B. I. P. ENGINEERING LTD., ALDRIDGE ROAD, STREETLY, STAFFS.

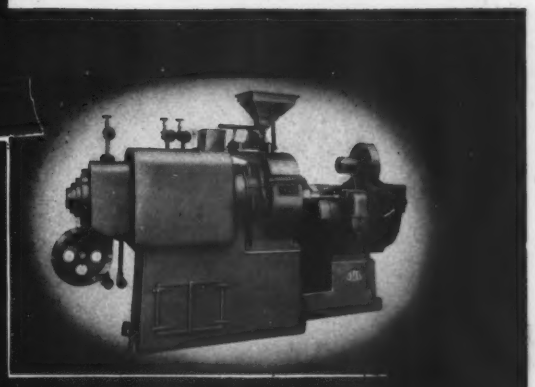
Precision Calender with three superimposed and one offset roller. Flood lubrication.





The Hallmark

of DESIGN, SERVICE and PERFORMANCE *in* **RUBBER AND PLASTICS MACHINERY**

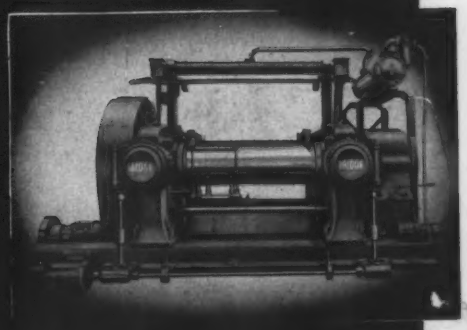


The Bridge — Banbury Patent Mixer. (1)

Precision Calender with four superimposed rollers. Flood lubrication. (2)

4½" Cold Feed Plastics Extruder. (3)

High temperature 22" x 60" Plastics Mill with flood lubrication. (4)



It was over a thousand years ago that Alfred the Great—probably a kinsman of ours—let the cakes burn in the cottage of the shepherd's wife. He was absorbed in the problem of military strategy against invaders.

THE ART OF CONCENTRATION

This example of mental concentration persists in every department of the Ferguson Technical Organisation today. The toast and buns of our ardent Technicians may burn . . . their tea get cold and the weather become nationalised, but nothing can divert their attention from testing Powders on Laboratory Benches and in Experimental Moulding Presses . . . promptly advising customers by letter or 'phone . . . and in aiming to give each particular customer the exact type of Powder to suit his particular requirements.

It is through such concentration that our customers save time and trouble in their Moulding operations, by first contacting Fergusons, and thus making SURE that the finished Moulding is dead right—not right "dead"!

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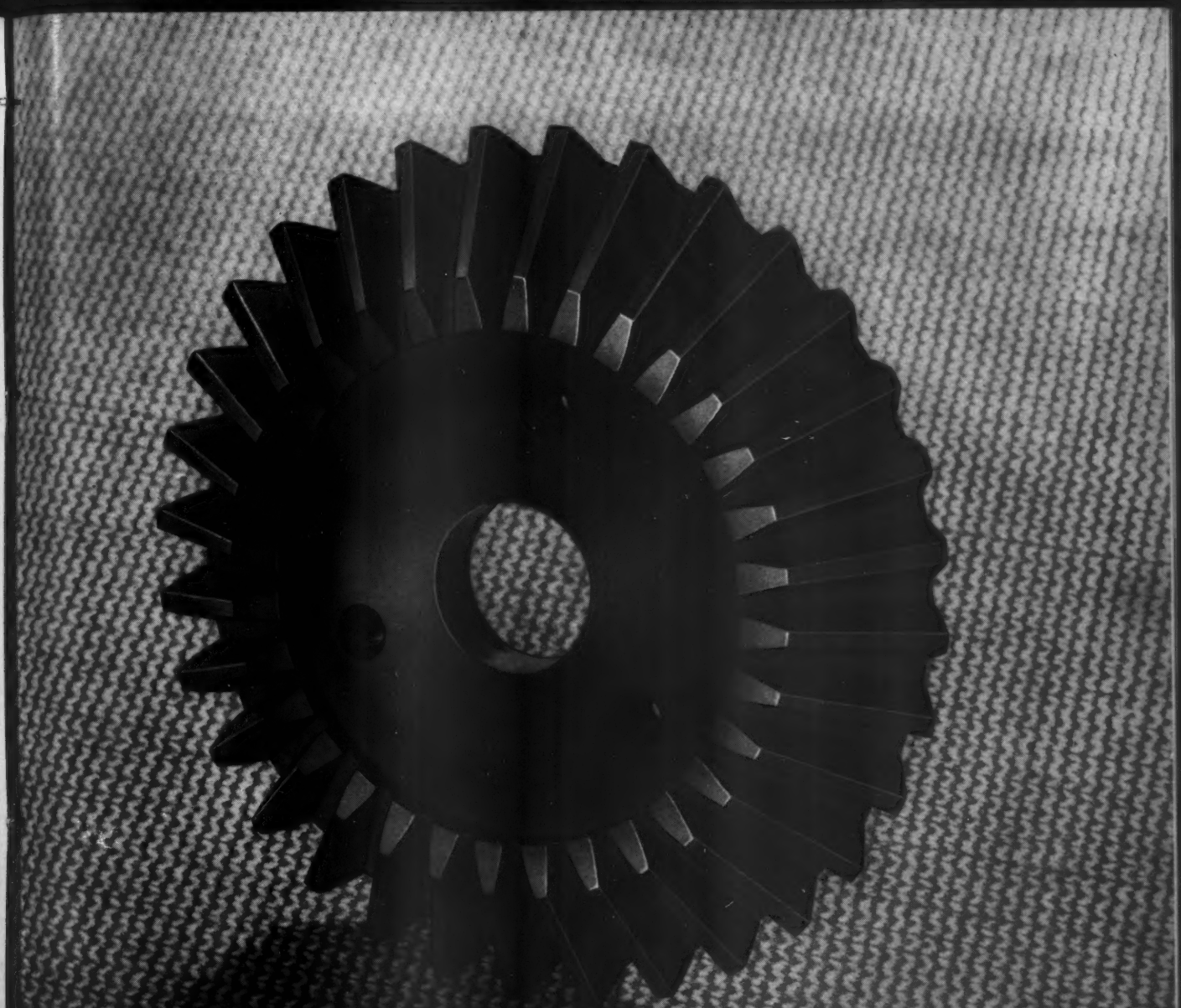
EINAR HOLMARK 19, G1. Kongeyej, Copenhagen V, Denmark.



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ELO
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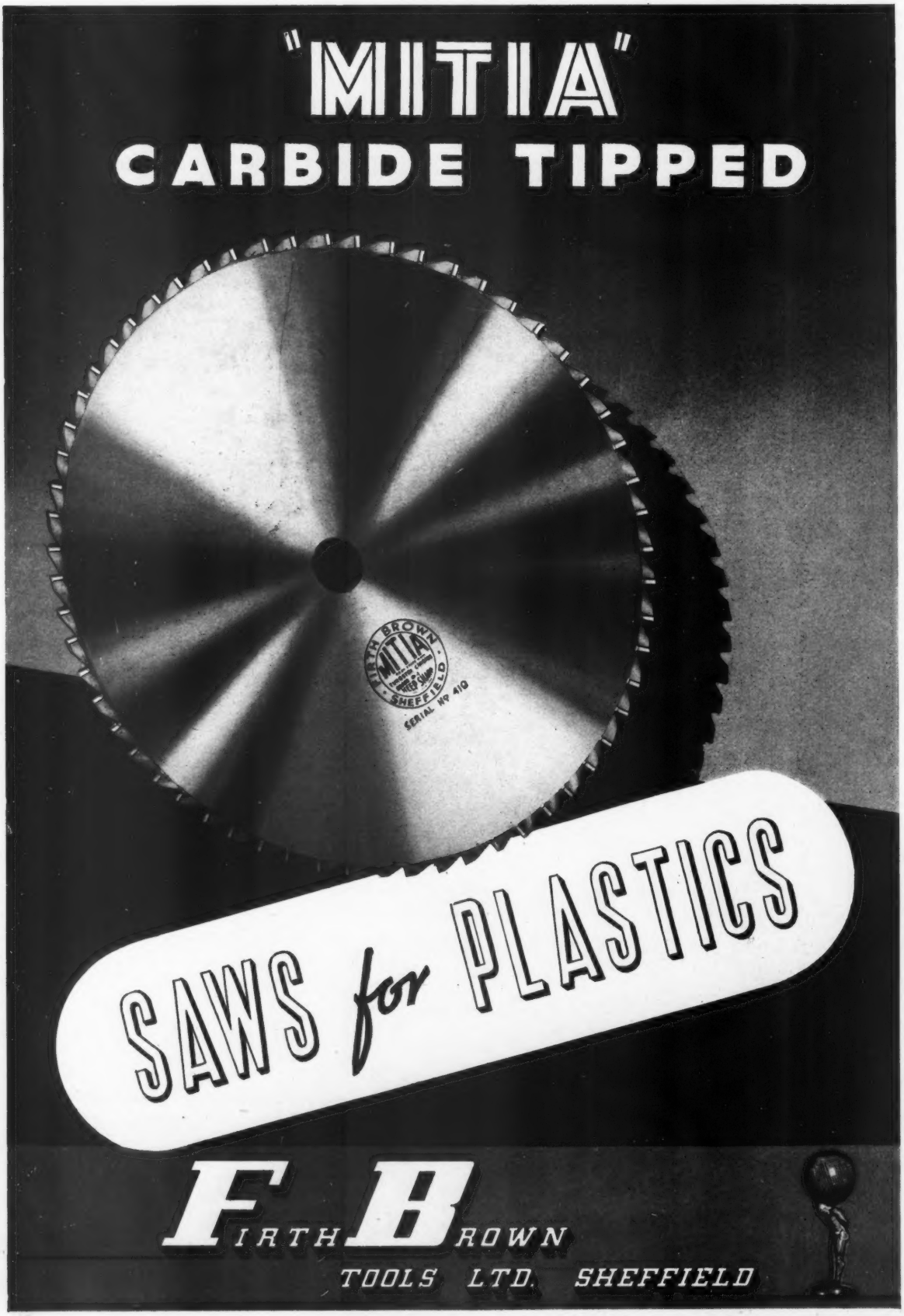
BIRKBYS LTD. LIVERSEDGE YORKSHIRE
London Office :- 79 Baker Street W.1.

MOULDING IN **ELO** PHENOLIC MATERIAL

We look forward to seeing you on **STAND C 417, B.I.F., CASTLE BROMWICH, in MAY, and STAND A 16, BRITISH PLASTICS EXHIBITION, LONDON, in JUNE**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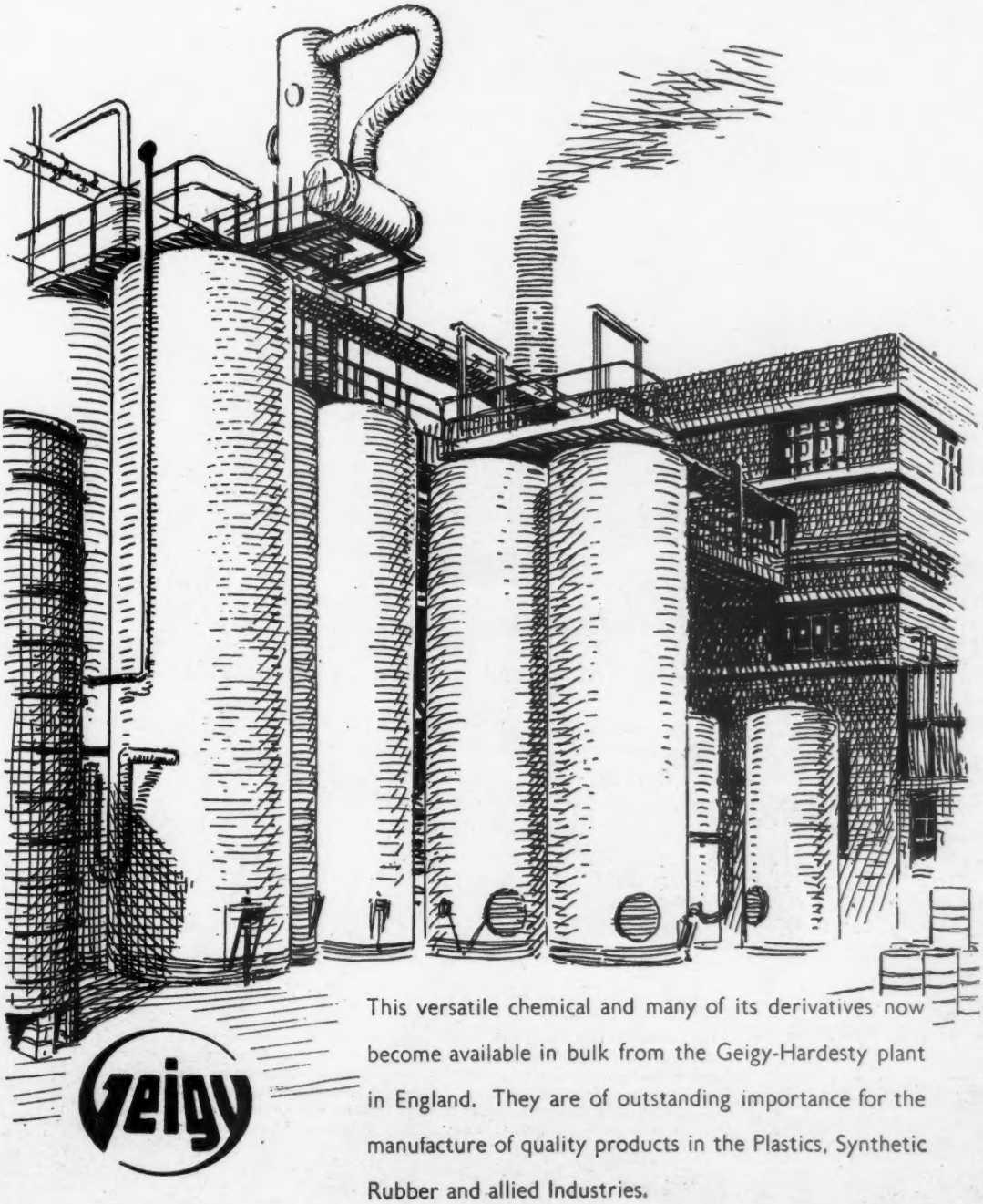

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This versatile chemical and many of its derivatives now become available in bulk from the Geigy-Hardesty plant in England. They are of outstanding importance for the manufacture of quality products in the Plastics, Synthetic Rubber and allied Industries.

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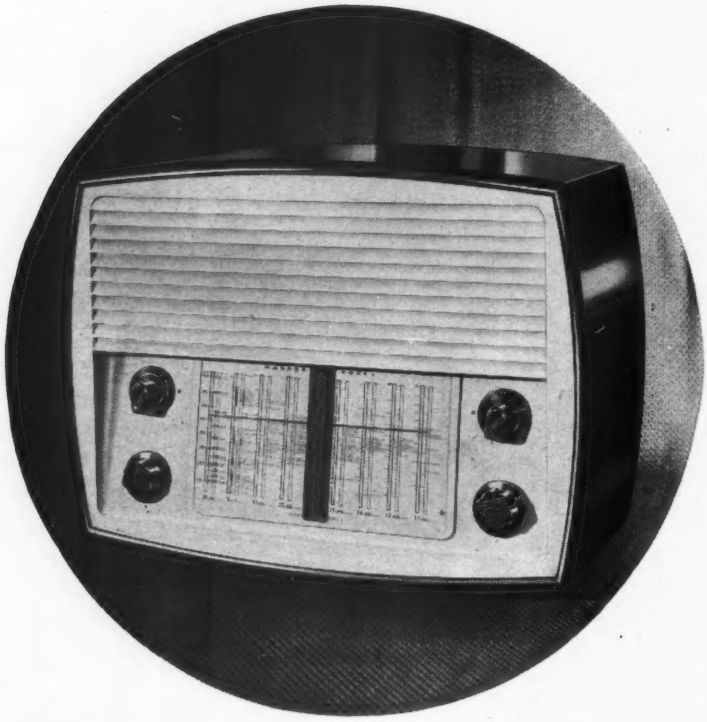
Affiliated Companies and Representations in Australia, South Africa and all Industrial Countries.

P18

IMPORTANT CABINET DECISION!



our good friends

Murphy Radio (of envied reputation) wanted a new moulded cabinet — of the highest possible quality. Its advanced design called for skilful tool-making and expert finishing, to give a perfect enamelled appearance free from flash and "rags", file marks, dust and grease. The illustration shows the result — and the wisdom! — of Murphy's important decision to let Ekco Plastics do the job.

Tool-making and moulding by EKCO

The cabinet measures 19¼" x 14¼" x 8¼" and is moulded in a 1000-ton press from 9½ lb. of material. The bottom force of the tool is built up to ensure dead sharp corners. Separate bars to form the louvres are fitted, enabling any bar to be replaced if necessary. Fixing of chassis, wavescale, speaker etc. is generally by self-tapping screws, for which ribs and bosses, subsequently drilled, are provided. A specially matched dark brown phenolic material is used, and the whole of the front (except the mitred edge) is sprayed with cream enamel stoved on.

EKCO *Plastics for Industry*

E. K. COLE LTD., EKCO WORKS, SOUTHEND-ON-SEA, ESSEX

A PROJECTILE PRODUCT

PRECO

2, 4, 6, 8, 16 ounce

INJECTION MOULDING MACHINES

THE Projectile & Engineering Co. manufacture [illegible] Injection Moulding Machines from 2 oz. to 16 oz. [illegible] designed to meet the most exacting requirements of the Plastics Industry. They are self-contained with [illegible] cycle and hydraulically operated. They have a [illegible] plasticising capacity and the rate of injection [illegible]

The PROJECTILE & ENGINEERING COMPANY Ltd.

[illegible] ACRE STREET, BATTERSEA [illegible]

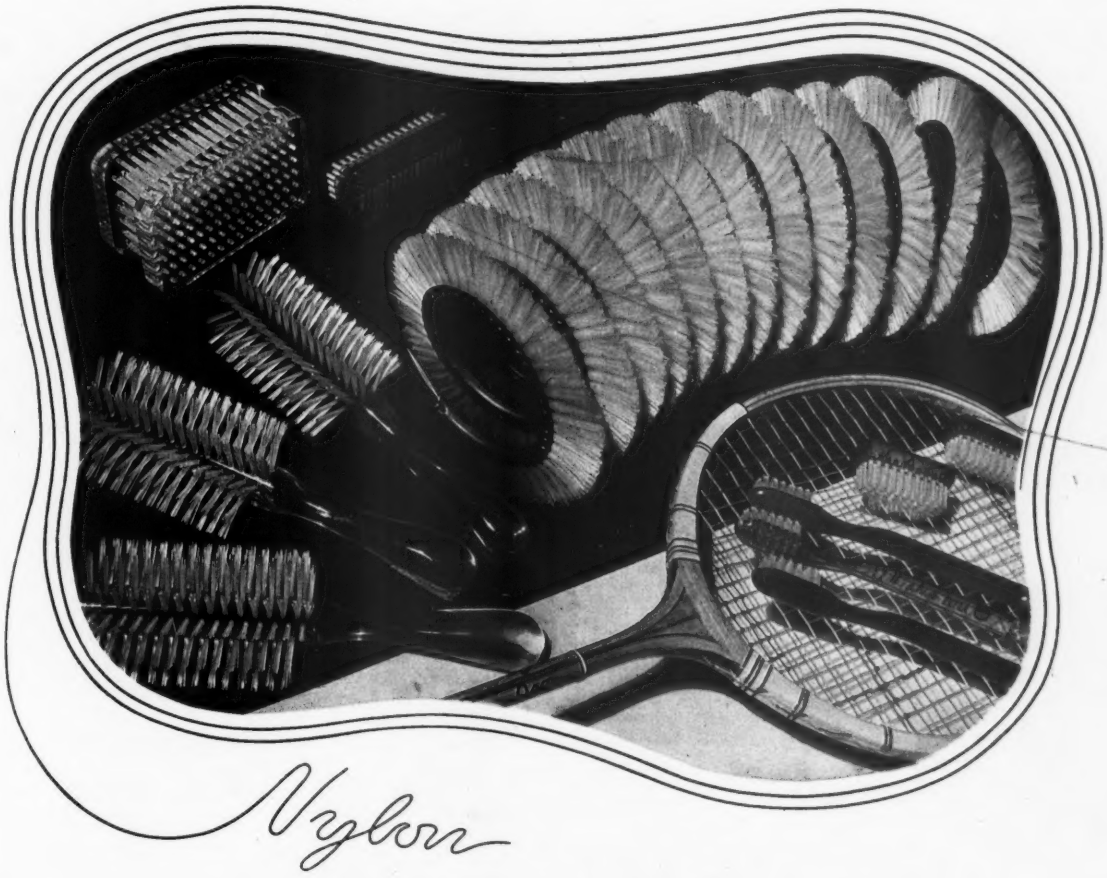
Rely on

STYRON

POLYSTYRENE
GRANULES

R. H. COLE AND COMPANY LIMITED
2, CAXTON ST., WESTMINSTER, LONDON, S.W.1.
'PHONE : ABBEY 3061 (10 LINES). 'GRAMS : GERATOLE, PHONE, LONDON.

Product of Dow Chemical of Canada Ltd



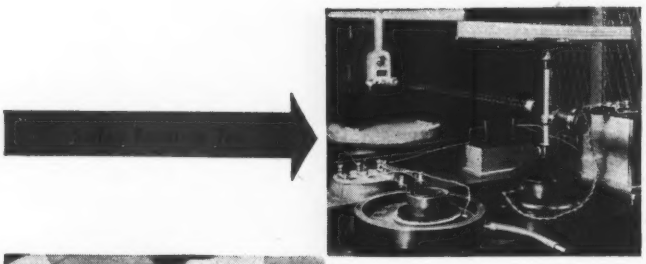
Nylon monofilament is wonderfully versatile. In the home, nylon-tufted tooth, nail and hairbrushes—attractive and hygienic —have won lasting popularity.

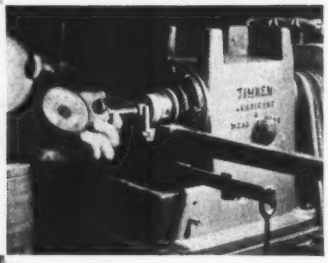
In industry, nylon is widely used for a variety of heavy duty brushes, as well as in paint brushes, for which tapered monofilament has been developed. In the sphere of sport, nylon strings for racquets are hard wearing and unaffected by damp, while nylon casts and lines have long been appreciated by the angler.

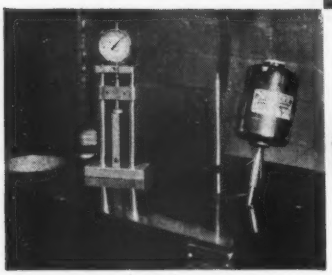
IMPERIAL CHEMICAL INDUSTRIES LIMITED
LONDON, S.W.1

P.N.102

What do you mean by TESTING?







P 32

Tests cannot make good materials, but certainly good plastics cannot be made without tests. And the more searching they are and the greater their number the more effectively can the quality be controlled. Every hour of every day, in laboratories equipped with every modern scientific aid, a staff of chemists, physicists and engineers is testing and checking the quality of BAKELITE moulding material as it is manufactured. The results are recorded and mathematically analysed, so that each BAKELITE material has its own case-history. The knowledge thus derived gives confidence in the continued satisfactory performance of the material. The search for facts about BAKELITE materials goes far beyond the requirements of British Standards. And all this activity, and all these resources, provide further reasons for the quality and consistency of BAKELITE moulding materials.

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Plastics

DEALING WITH THE MANUFACTURE, USES AND POTENTIALITIES OF PLASTIC MATERIALS

PROPRIETORS: TEMPLE PRESS LIMITED

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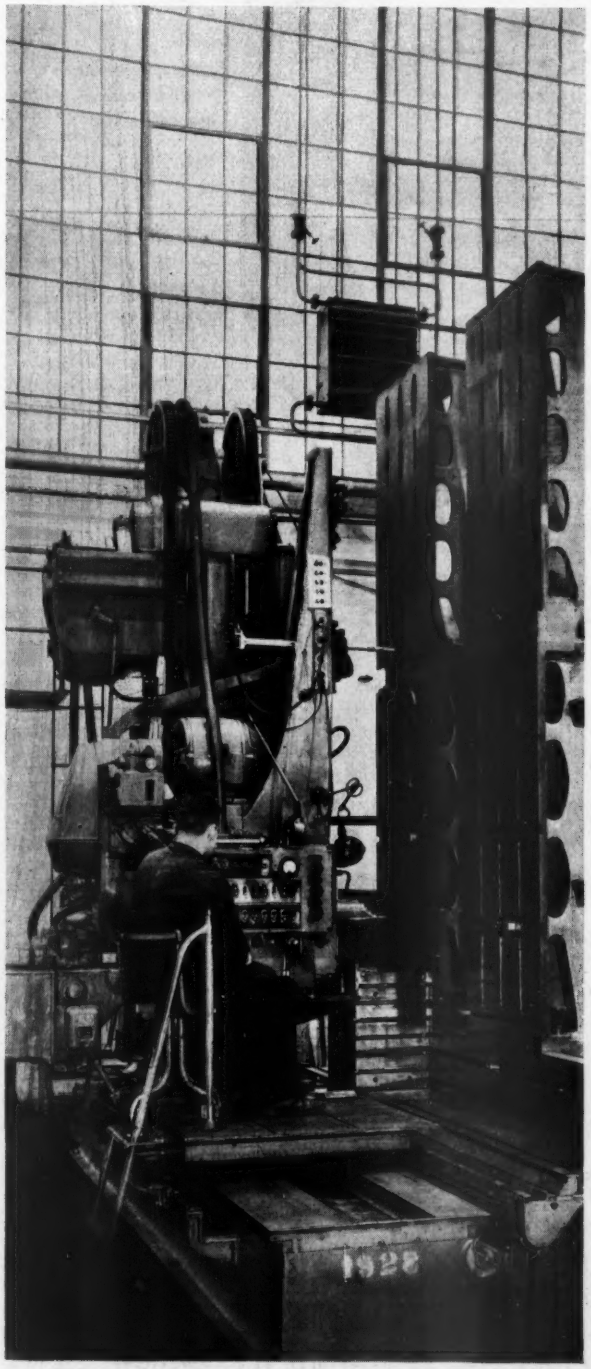

EDITOR: M. D. CURWEN, B.Sc., A.R.I.C.

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Keller die-sinker, installed at the works of The Projectile and Engineering Co., Ltd., Battersea, for making parts of "Peco" injection moulding machines and also large moulds for the plastics industry.

BM145

Photograph reproduced through the courtesy of Ultra Electric Ltd.

a thermoplastic television mask

. . . . . moulded for Ultra Electric Ltd. from brown Diakon material. The interior contour of the mask follows the shape of the cathode ray tube, making a complex shape which would be both difficult and costly to produce by any other method. Fixing to the wooden cabinet is simply done by attaching clips to spigots on the underside of the moulding. With its attractive plain brown colour and polished, hard wearing surface the mask makes another highly practical application of moulded plastics for the television industry. Moulds and mouldings are made by British Moulded Plastics Ltd. at their Walthamstow works

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Plastics

VOL. XVI. No. 164 MARCH, 1951

" The spiral form of many shells seem to have afforded a more frugal manner of covering the long tail of the fish with calcareous armour . . . formed by a mucous secretion from the skin of the fish, as is seen in crab-fish, and others which annually cast their shells, and is at first a soft mucous covering (like that of a hen's egg, when it is laid a day or two too soon) and which gradually hardens. This may also be seen in common shell snails; if a part of their shell be broken it becomes repaired in a similar manner with mucous, which by degrees hardens into shell."

Philosophical Notes to " The Botanic Garden," Part I, by Erasmus Darwin, 1791.

EDITORIALS

Raw Materials

MR. NORMAN PUNFIELD has written (see " Letters to the Editor," page 74) to the effect that a black market in plastic raw materials is in being.

He advocates the reconstitution of a control similar to that which functioned so fairly and smoothly during the war under the ægis of Sir Frank Merriam and his lieutenants, of which the present President of the British Plastics Federation was one.

No doubt such an organization, distasteful in the extreme as it is during peace-time for a number of reasons, would have a good effect, although control of imports for private account might prove difficult. But there would still be that great difference, that while war-time control was guided by the overriding principle of producing units for war purposes and thus itself controlled by the Ministry of Supply, a new control would be under no such simple and rigid guidance. Its very looseness might be a danger. The difficulties are emphasized by the uncertainty as to what manufactures will be permitted when the rearmament programme begins and what will not.

On the other hand, it might be argued that since some form of Government control is probable when the rearmament programme is clarified, we might as well have the organization in being. What gives added force to such an argument is the fact that some special users are in fact already working on high-priority jobs and are getting all the synthetic resins and other materials they need.

This is an uneasy interim period, bewildering to both raw material producers and to users, but we echo Mr. Punfield's plea that the old-established concerns, who for so long have been partners in creating our industry, should get their fair share. Perhaps a middle way based on allocation on intake in a specified year is not impossible.

Whatever the result, Mr. Punfield has performed a difficult, unpalatable, yet important duty by bringing the matter into the open. His very position and the fact that for so long he has been, as he still is, in the councils of the industry indicates the seriousness of the situation.

Let us hope that the Washington discussions will soon be fruitful and resolve the problem.

Plastics and Catering

SOME months ago we pointed to the production of plastic bottles as one of the most promising in our industry. To-day, the publication by the Ministry of Food of its Report on Hygiene in Catering Establishments and the simultaneous holding of the Hotel and Catering Exhibition at Manchester, throw a light on the great change that must inevitably take place in the vast industry of supplying food to the public and of the promising rôle that plastics can and must play in it.

The problem of hygiene in the catering industry, which has grown so vast since the war years, has been made complicated and difficult, not only because of the too rapid growth of the industry, but also because of a widespread lack of appreciation of what hygiene means and an absence of trained workers. The well-known catering establishments famous before the war for cleanliness and training of staff are still with us, but even amongst some of these a deterioration in quality of staff is very noticeable. There is also shortage of proper equipment and its high cost. That this has been accompanied by a tremendous increase in the number of workers eating out, generally because of the low ration level in the home, is a significant fact and a dangerous one. How significant it can be is gauged by the Ministry of Food's disclosure that there are some 236,000 catering establishments, in which nearly 103 million meals are consumed every week.

The Report in question is a most careful, comprehensive and understanding compilation, worthy of the greatest praise, and if the measures to improve existing conditions, as laid down in its general objectives and codes, are carried out, there will be much to thank the Ministry of Food for. It should be read by every member of the community, especially those who live in crowded cities.

The whole problem can be expressed as the need for creating new standards of cleanliness; our immediate interest lies in the fact that such new standards can be satisfied in part by plastics which can help so much in some of the conditions inimical to sound, hygienic practices and set out by the Report. Amongst these conditions of special interest to us are (1) specific defects of premises; (2) neglect of personal cleanliness; (3) failure to protect food from vermin, including flies; (4) failure to cover food on display; (5) preparation of food the day before consumption and failure to store it at sufficiently low temperatures.

If we consider some few of the plastic materials now available and how worthily they have already served, at least a part of the problem would be solved.

Of prime importance is the first condition—specific defects in premises, which, while referring generally to bad lay-out, indicates specifically the danger of dirty and cracked floors and walls. If only the nation could overcome the bogy of initial outlay at a time of widespread high prices, plastic flooring and laminated sheeting or tiles for walls would create not only a new air of cleanliness for customers to enjoy and for workers to work in, but would permanently avoid the necessity for repainting—no small item in overheads in these days of appallingly high paint and labour costs. We have only

to visit some of the milk-bars where such plastics have been introduced to see the general cleanliness, not only of such walls or bar-tops, but the infectious "uplift," if one can call it so, of the individual on entering such a bar. We are sure that much of the popularity of these bars is due to the "optical cleanliness," whether it is hygienic in detail or not.

Much of the value of plastic materials lies in the fact that they are smooth, not absorbent and therefore readily cleaned. Thus under the second defect—"neglect of personal cleanliness"—must be considered the supply of plastic clothing: caps, aprons and, for certain occasions, gloves. Give female workers clothing that is not only pretty but exceptionally easy and cheap to wash and is almost instantaneously "dry," then their borrowed new cleanliness will improve their own personal hygiene. In other words, cleanliness is normally an expensive business, but plastics can help in making it cheaper and easier.

Difficulties of protecting food from flies and from dust during display can be overcome by the excellent covers now available in transparent plastic. These are a godsend to small restaurant and bar, and there is a complete absence of breakage. Experienced observers have noted the pleasure of all customers on seeing their growing use.

Failure to store food at low temperatures merely indicates the growing awareness of the need for wider use of refrigerators. This, as we have already noted, is growing rapidly and there is little need to point to the value of plastics not only in the construction of the machine itself, but also in the various containers employed therein. The ability of plastics to withstand sterilization, low temperatures and breakage make them of outstanding value.

The Catering Trade Working Party responsible for the report have also something to say on crockery: "We invited opinions on the use of utensils made of plastic materials in place of crockery. Opinions varied as to their utility, but favourable opinions were expressed in the newer types. Provided they are of a quality which can withstand temperatures as high as 170 degrees F. without detriment, we consider there is no objection on health grounds to their use." This is fair comment and will rouse, we feel sure, the plastics industry to still greater effort in this vast field. The Report can be purchased from His Majesty's Stationery Office, price 1s. 9d. net.

In passing, our "Plastics in the Service of Man" series, on pages 68-71, deals appositely with the catering industry and its variety.

MOULDING POWDER AND SHOT

Sir Knight is not so Bold

The B.B.C. have appealed for the loan of several sets of armour which are required for historical plays in the television service but are very worried about the heavy weight carried by the knights in the said plays. Since the horses are hunters and not the huge shire horses on which the knights of old did in fact ride, it is not quite clear whether it is our modern slender hero or the horse or both that would stagger at the knees. It seems a pity that the B.B.C. has no plastics section but the "prop" manager of any film studio—and they all know a good deal about such matters—could run up a few sets from acetate or "acrylic" sheet sprayed with aluminium paint in less time than it takes an average foul knave to bite the dust in the arena.

* * *

Help the Housewife!

I suppose one of the worst jobs that the average housewife has to do is the weekly, or so, emptying of the dust-collecting bag of the average vacuum cleaner. It is indeed a filthy business with the added proneness to occasional "accident" resulting in dust, fluff and what-not flying in the housewife's face and mouth. More than one housewife has asked me why the plastics industry (presumably the fount of all cheap production) cannot make a "throw-away" bag at low cost. Obviously since the bag must be an air-filter and therefore porous it would still have to be made from a fabric so that plastics is hardly the solution. It can also be assumed that the vacuum-cleaner manufacturers have long worried about the problem without finding a really cheap bag. Probably the only real solution is the destruction of the dust, which is predominantly organic, into gases by passage through an electrically heated element. Indeed, a friend tells me that he saw such a one in action in a hospital in pre-war days.

* * *

More Dust Filtering

While discussing some months ago in this office the tendency of polythene to collect fine dust under certain conditions, I suggested that somebody should take advantage of this property of picking up electrostatic charges and invent a new filter. This was not entirely a novel suggestion as solid organic dielectrics have already been considered, e.g., ebonite and even gelatine, which is a rather poor dielectric. I have now received the news that the Goodyear Tire and Rubber Co., of U.S.A., have made a dust filter using polythene in shred form made from very thin film. It is claimed that not only ordinary dust and soot are collected but that the finest smoke particles can be removed from the air. One of the most important advantages of the system, I should say, is the fact that the polythene can stand up to any sort of rigorous washing with a detergent to remove the dirt.

* * *

Trumpet for Islyn

It is with exceptional pleasure that I announce the election of my old friend, Islyn Thomas, to the Presidency of the Society of Plastics Engineers, Inc., U.S.A. While congratulating him I should also like to congratulate the Society in choosing this amazing fellow, so overflowing with human kindness and understanding, and so knowledgeable in his own line of country, to lead it in the forthcoming year. To me, personally, and I think to many others in this country which he visits so often, he is the perfect industrial ambassador of the type the U.S.A. so often extrudes from the technical machine. He's an American but he's also Welsh (he left Wales when a boy) and I should say this mixture must approach the ideal which is probably an Anglo-Scots-Irish-Welsh-American amalgam in equal parts. He is president of the Thomas Engineering Corp., Newark, N.J., and others, and wrote that "best-seller," "Injection Moulding of Plastics." He will be over here again in a month or so.

DOGSBODDY.

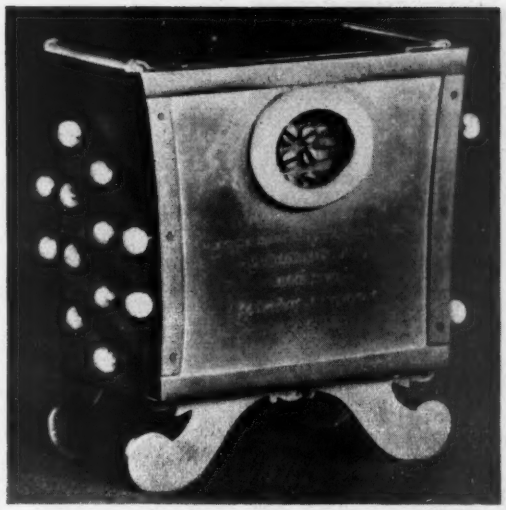


Fig. 1.—Symphonium (24 keys), invented by Sir Charles Wheatstone, circa 1825. It was blown through the circular orifice.

Fig. 2.—Two all-plastic mouthorgans or harmonicas—"Chromatic" and "Swingboy"—the productions of British Mouthorgans, Ltd. (For components see Figs. 3 and 5.)

Mouthorgans and Dolls

Lessons in Moulding Accuracy and Economy

WE are not sure what position the mouthorgan occupies in the hierarchy of wind instruments, but it certainly adds to the gaiety of nations and satisfies the emotions of its executants and lovers, who can be counted by the million. It takes its origin directly or indirectly from the pipes of Pan, from the Chinese "cheng," and from the great organ itself. Small in size, it yet produces music that is so emotionally stirring as to leave no doubt as to its forebears.

The first mouthorgan seen in Europe was produced in England about the year 1825 by Sir Charles Wheatstone, better known to physicists as the inventor of the Wheatstone bridge. We believe he had travelled in China and there, no doubt, saw the "cheng," a "mouthorgan" with long, upright pipes, and used it as the basis for his invention which he made in nickel-silver and called the "symphonium" (Fig. 1). It will be interesting to scientists generally to know that his company, C. Wheatstone and Co., Ltd., is still in active operation as makers of musical instruments not 200 yards from the Marble Arch in London.

The great advance in manufacture took place in the 1860s in Germany, whence cottage industry and then factory in the Black Forest region fed the growing world's market with

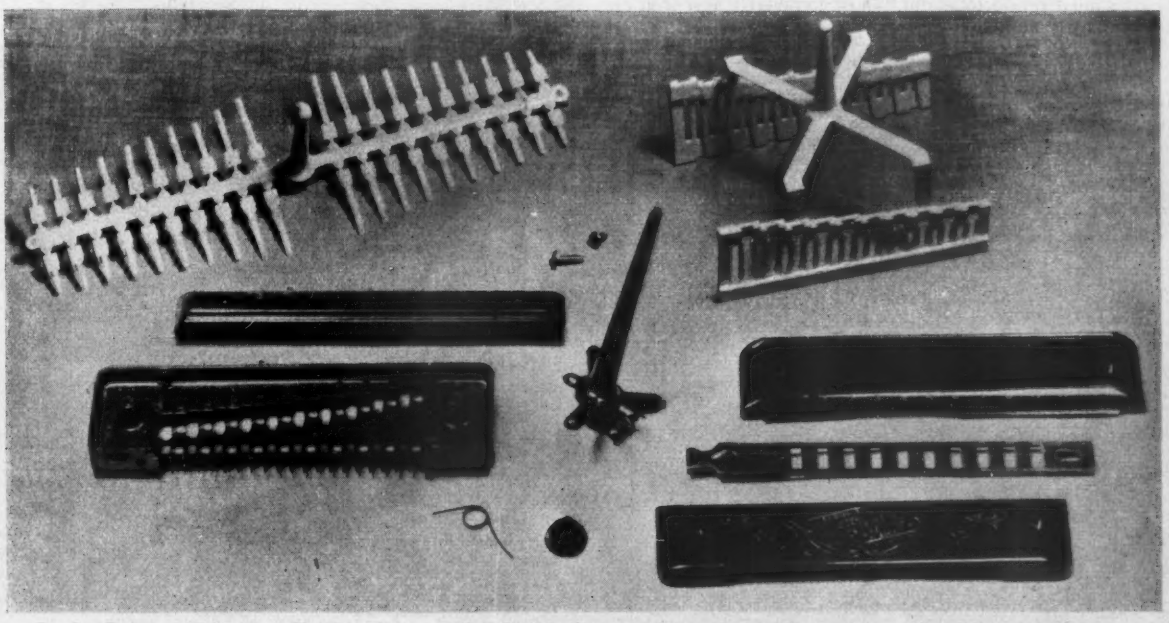


Fig. 3.—Components for the "Chromatic" harmonica—all plastic, excepting four screws and one wire spring. Left (top to bottom): Reeds, mouthpiece, body. Right (top to bottom): Reed plates, front cover, chromatic slide, rear cover. Centre: Metal fixing screws, sprue, slide knob, metal return spring.

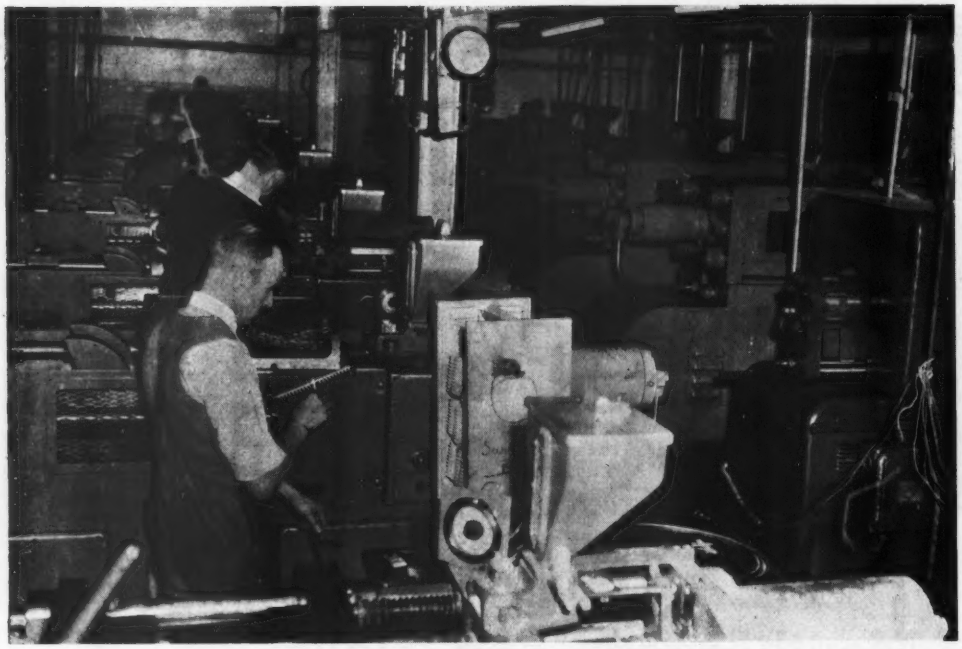


Fig. 4.—Battery of injection moulding machines at the works of British Mouthorgans Ltd., a subsidiary of D. G. Todd and Co., Ltd., Southport. The machine in the foreground is producing reeds for the "Chromatic" harmonica.

the new instrument in its more or less modern form. Much of the world's production of the traditional type, that is, of wood and metal construction, still comes from the same source, owing to very low labour costs. As a result, competition in this country in this sphere is almost negligible.

It is worth noting, however, that inevitably the labour costs of an intricate construction of wood and metal into a small unit must prove a high proportion of the whole. The shaping, varnishing or painting of the wood, the accurate cutting or punching and finishing of the metal reeds, the production of highly polished upper and lower metal covers, the assembly by gluing, screwing or otherwise fastening units together, to say nothing of wastage of material during such production, produce those disproportionate labour costs so common in many similar productions but almost completely absent in our own industry.

It is therefore not surprising that the only means of creating a home industry under present conditions should prove to be the evolution of the plastic mouthorgan, and that post-war urgency has seen its birth, its growth and its success. Thermoplastics and the injection moulding machine have opened up possibilities, we might say actualities, of new beauty and of new flexibility in high precision moulding, coupled with such overall economy as is completely unobtainable when using metal and wood.

Obviously there is a difference in tone values of the music produced on the plastic mouthorgan compared with those of the metal and wood type. One would expect that, from the very different characteristics of metal reeds and plastics reeds, not only because metals possess a modulus of elasticity of the order of $20/30 \times 10^6$ while thermoplastics are of the order of $3/5 \times 10^5$, but also because metals are crystalline and plastics are amorphous. The results, so far as music is concerned, is that with the plastics instrument, overtones and harmonics are damped, thus resulting in softer tones.

Perhaps it is invidious to compare strictly the two

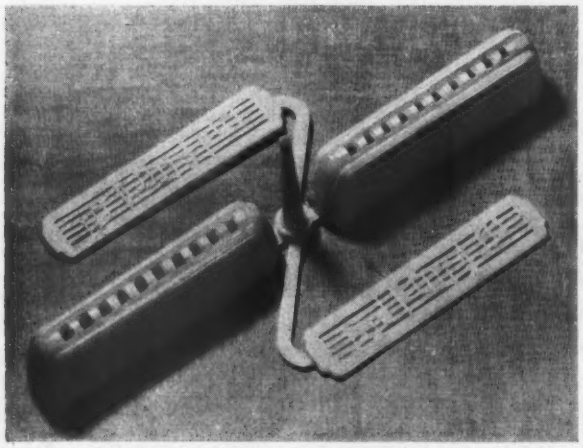


Fig. 5.—Two back plates and two bodies for the "Swingboy" harmonica are produced in one shot.

Fig. 6.—This "Windsor" injection machine is moulding back plates and bodies for the "Swingboy" harmonica.

Fig. 7.—Cementing the "Chromatic" harmonica parts. (Note the hood for removing solvent vapour.)

Fig. 8.—Fitting the reeds into the body of the "Swingboy" harmonica.

Fig. 9.—Inspecting and packing harmonicas, aided by conveyor belt.

instruments, although we ourselves welcome the production of a new instrument in which the metallic timbre of the conventional type is absent. It is interesting to speculate that we may yet see two types of harmonica orchestra, just as we have brass bands and silver bands!

British Mouthorgans, Ltd., a subsidiary company of D. G. Todd and Co., Ltd., the well-known plastics doll and toy makers, began operations in 1946. To-day in Southport, Lancashire, its moulding factory exemplifies to a high degree the new mechanical ingenuity and the versatility of the plastics industry. Here we see the transformation of the multiplicity of units and standard operations into a few individually intricate parts that can all be moulded in the one shot on the same machine in the space of 30-35 secs. Since each individual, intricate moulding is equivalent to several parts produced by the traditional methods, and since the thermoplastics employed can be cemented strongly and simply, final assembly is rapid, accurate and completely satisfactory.

Five small and large types of mouthorgan are produced: "Midgemonica," "Bandboy," "Swingboy," the all-plastic "Chromatic," and the "De Luxe Chromatic" incorporating plated covers and metal-filled reeds.

All moulding is by injection, using polystyrene as moulding material, on R. H. Windsor machines that vary in capacity up to the 8/10-oz. type. There is also an 8/10-oz. Reed-Prentice injection moulding machine.

The structure and production of the "Chromatic" harmonica is well portrayed in Fig. 3, which shows all the parts as produced on the moulding machine and the astonishing economy of results compared with traditional methods. All the units (there are only five small metal parts—four

Fig. 10.—This twin-screw Windsor extrusion machine, normally producing continuous p.v.c. strip, is also used for incorporating colour with polystyrene.

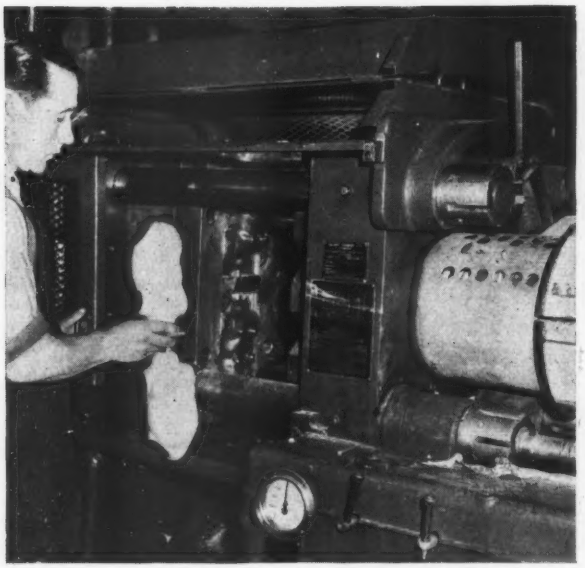


Fig. 11.—8/10 Reed-Prentice injection machine producing two doll bodies per shot.

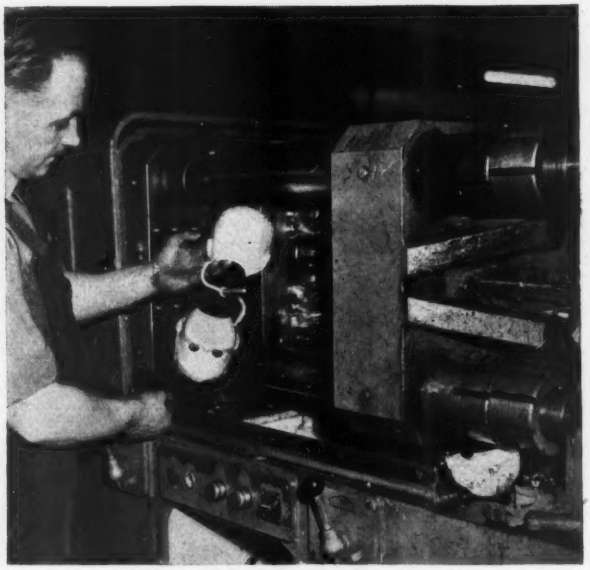


Fig. 12.—6/8 Windsor injection machine producing two doll heads per shot.

screws and one wire spring) are produced on three moulds. Six units—front cover, rear cover, body, chromatic slide, slide knob and mouthpiece are produced in one mould; the reeds (40 in number, and thus sufficient for four instruments) from another mould; and the reed plates (two in number, for two instruments) from the third mould. The accuracy of the mould and of the moulding itself is especially pronounced in the production of the reeds and the body holding the reeds. The latter are about 10/1000 in. thickness, the bases being "dovetail" in shape so as to fit snugly into a similarly shaped orifice in the body.

In the case of the simpler "Swingboy," design of moulding is very different, there being three main units only: back plates, body and reeds. As will be seen from Fig. 5, two back plates and two bodies are produced from the one mould. As with the "Chromatic," the 10 reeds are moulded separately. The smaller "Midgemonica" has eight reeds.

Following removal of the mouldings from their sprues, gates and runners, there is almost a complete absence of finishing operations. They are passed to the assembly sections where cementing operations are carried out. Fig. 7 shows the cementing of "Chromatic" harmonica parts: it will be noted that there is an efficient suction hood in front of each worker to remove solvent vapour. In this photograph will also be seen some of the novel types of jig that are employed to hold the structure after assembly. Fig. 8 shows part of the assembly of the simpler "Swingboy," with the operator fitting the reeds into the main body. The only finishing operation that is carried out is the "printing" of the word "Chromatic" in contrasting gold paint on the front cover of the instrument. Finally, Fig. 9 shows one of the inspection and packing lines, where a conveyor belt receives the finished productions which move automatically past inspectors and are then placed in their containers.

Other Activities

One of the greatest of the activities of D. G. Todd and Co., Ltd., is the production of dolls in all its facets. There is the specialized manufacture of a large variety of dressed dolls, of dolls with fixed eyes, of dolls with moving eyes, of dolls that walk and of dolls that talk!—all achievements of high merit and of especial pride of the company. The measure of these achievements is reflected in production figures, which have at times exceeded 20,000 completed dolls (including dresses) per day.

The same factory in Tulketh Street carries out the moulding of the dolls and their eyes, the raw material in this branch being cellulose acetate. As will be seen from Fig. 11 an 8/10-oz. Reed-Prentice injection machine produces two doll bodies per shot; Fig. 12 shows a 6/8 R. H. Windsor machine producing two doll heads per shot.

The company has also installed one of the latest twin-screw Windsor extrusion machines (Fig. 10) for making continuous p.v.c. strip for other of its productions. This machine is also employed for incorporating colour with the polystyrene moulding material.

In congratulating both British Mouthorgans, Ltd., and its parent company, D. G. Todd and Co., Ltd., on their endeavours, and especially for their work in introducing a new industry to this country, we thank the two directors, Mr. D. G. Todd and Mr. J. Robinson for their kindness in patiently explaining the production to us in great detail.

Fig. 13.—A range of dolls produced by D. G. Todd and Co., Ltd., and sold under the trade-mark "Roddy."

War-time asbestos "curtain" with mica window.

The new fire-fighting helmet with "Perspex" visor, as introduced by the Ministry of Civil Aviation.

New Helmet for Airport Firemen

THE fire-fighting department of the Ministry of Civil Aviation has for some time been studying the special requirements of airport fire brigades, with a view to providing equipment designed specifically to combat the hazards which are encountered when dealing with aircraft fires. Although these units may be called on to attend fires in airport buildings or equipment, their primary purpose is to combat fires located in aeroplanes. For this purpose it is frequently necessary to cut an entry into the fuselage and to climb through restricted gaps in order to get close up to the source of the flames. It is obvious that the wide brims on the conventional helmet are not only superfluous for this job, but that they could prove a hindrance to rapid movement within the aircraft. Therefore, the first consideration in designing the airport firemen's helmets was to obtain a shape which would give maximum protection to the head and neck, but which would not extend any further and so cause hindrance to movement.

Another factor to be taken into consideration is that the majority of aircraft fires are caused by petrol burning at very high temperatures. Under these conditions the effectiveness of the fireman is dependent on how close he is able to approach the fire and how long he is able to stay at close range. It has been found that heat on the unprotected eyes and face makes it impossible to remain at close range for any length of time. During the war the R.A.F. made use of an asbestos "curtain" fitted to the standard steel helmet and having a small mica window. This, however, gave very limited visibility and is clumsy to remove quickly should the mica window become obscured or clouded or damaged due to an impact.

The solution of this problem was found by co-operation between the fire-fighting department of the Ministry of Civil Aviation and the manufacturers of the new helmet, James Hendry, Ltd., of Glasgow. To protect the fireman's face a visor of unplasticized "Perspex" is fitted to the helmet. This shield normally rests on the curtain of the helmet (i.e., the part protecting the back of the neck), and can be lowered in front of the face by a single movement. It has been found that a considerable amount of radiant heat is absorbed or deflected by this transparent screen and consequently a much closer approach can be made to the actual fire.

Although on an absolute standard the heat resistance of the material is not too high, it must be remembered that the usual alternative to the use of the "Perspex" visor is to leave the face unprotected. Also, although "Perspex" cannot be classed as non-inflammable and can, in fact, be ignited by a flame, this was not felt to be sufficiently serious to cause the material to be rejected. As experience has shown, heat generated by a fire would prevent a fireman from too closely approaching the flames, and thus any exposure would be of sufficiently short duration to make it harmless to the screen and to the fireman.

The construction of the crown of the helmet is in leather, with a thin extra strip forming a protective "comb." The shaped "Perspex" visor is fitted to the helmet by a large sliding pin-and-slot arrangement so that it is easily moved up and down, yet fits securely in either position without the need for locking. Special care has been taken to balance the position of the visor so that it fits comfortably in both positions.

A small number of these new helmets have been manufactured by James Hendry, Ltd., and these are now on test at London Airport. If these final "field tests" are as successful as preliminary tests at the Ministry's fire-fighting school in Wales they will come into general use at all airports controlled by the M.C.A.

Plastics Exhibition and Convention

At the British Plastics Exhibition and Convention, to be held at Olympia, London, June 6 to 16, a feature of special public interest, entitled "The Story of Plastics," is being sponsored jointly by the British Plastics Federation and the Council of Industrial Design. It is to demonstrate the chief properties and applications of plastics and to widen public understanding of their importance.

Subjects for discussion at the Convention are now announced: June 6, Inaugural lecture: "The Place of Plastics in Industry." June 7, "Progress in Plastics Materials," "Plastics in the Chemical Industries." June 8, "Vinyl Formulation and Compounding," "Plastics in the Textile Industries." June 9, Forum: "Buying and Selling." June 11, "True Synthetic Fibres," "Plastics in Building and Architecture." June 12, "Developments in Synthetic Resins," Housewives' Quiz. June 13, "Developments in Processing Plant," "Plastics in the Transport Industries." June 14, "Techniques of Fabrication," "Plastics in Surgery and Medicine." June 15, "Plastics in Film Production and Handling," "Plastics in Packaging."

National Packaging Exhibition

The second National Packaging Exhibition, held at Olympia, London, in the beginning of February, emphasized the importance of plastics to the packaging industry by a large number of the exhibits and by an impressive selection of machines used to convert the available plastics into finished packs. In the limited space available we are only able to review some of the most important producers and converters of these materials and packs, leaving a description of machinery for the April issue of "Plastics."

A NUMBER of manufacturers of raw materials for the packaging industry were represented at Olympia. Probably still the most important of the transparent wrapping films is straight regenerated cellulose film. Two manufacturers, **British Cellophane, Ltd.,** 17/19, Stratford Place, London, W.1 ("Cellophane"), and **Transparent Paper, Ltd.,** Bridge Hall Mills, Bury, Lancashire ("Diophane"), were showing a large variety of uses and methods of application for this film.

British Celanese, Ltd., Celanese House, Hanover Square, London, W.1, were showing cellulose acetate film and sheeting in a variety of thicknesses, including "Clarifoil" thin film, used for windows in cartons, for complete over-wrapping of boxes, and also as a laminated material in conjunction with metal foil to provide a heat-sealable film. "Celastoid," the more rigid type of cellulose-acetate sheet, finds greatest packaging application in the manufacture of transparent boxes.

On the stand of **Imperial Chemical Industries, Ltd., Plastics Division,** Black Fan Road, Welwyn Garden City, Herts, emphasis was placed on the methods used in sealing "Alkathene" polythene film and the various types of packs produced from lay-flat tubing. A "Perspex" tumbling barrel in which sealed and filled "Alkathene" bags were exposed to mechanical and chemical resistance tests was shown.

The Goodyear Tyre and Rubber Co. (G.B.), Ltd., Bushbury, Wolverhampton, were showing "Pliofilm" transparent rubber hydrochloride film, and various equipment for handling it, including the "Snug-Wrap" machine for wrapping irregular-shaped objects, which will be described in the next issue.

Hot-melt tank for "Crocell" dip-coating. (Made by Barlow-Whitney, Ltd., for Croda, Ltd.)

Venesta, Ltd., Vintry House, Queen Street Place, London, E.C.4, manufacturers of aluminium foil, were showing various types of this foil, including laminates with various plastic films.

Two manufacturers of hot-dip strippable coatings based on ethyl cellulose were **J. M. Steel and Co., Ltd.,** 36/8, Kingsway, London, W.C.2, and **Croda, Ltd.,** Snaith, Goole, Yorkshire. Both these manufacturers also produce a plastic strippable coating which is applied by spraying where the hot-dip method would not be applicable. These types of protective coatings are proving of particular interest for engineering components, especially cutting tools.

Accessory raw materials, such as adhesives and waxes, were also well represented. Of special interest was a range of waxes made by **Astor Boisselier and Lawrence, Ltd.,** Norfolk House, Norfolk Street, London, W.C.2, which incorporate various plastic materials such as polyisobutylene, polythene and ethyl cellulose, to give improved flexibility, surface finish, adhesion or moisture vapour resistance.

Synthetic resin adhesives were shown by **The Arabol Manufacturing Co., Ltd.,** 146A, Queen Victoria Street, London, E.C.4, **Feculose Co., Ltd.,** Wellington House, 125/130, Strand, London, W.C.2, **National Adhesives, Ltd.,** Slough, Bucks, and **Samuel Jones and Co., Ltd.,** 16/17, New Bridge Street, London, E.C.4.

A type of packaging material which has become very important in recent years is the pressure-sensitive adhesive tape. These are mostly based on cellulose film, but for particular purposes tapes based on ethyl cellulose, fibreglass cloth, polythene, p.v.c. and "Pliofilm" are also available Manufacturers who have developed these include **Durex Abrasives, Ltd.,** Arden Road, Adderley Park, Birmingham, 8, **Gordon and Gotch, Ltd.,** in conjunction with **Adhesive Tapes, Ltd.,** 75/9, Farringdon Street, London, E.C.4, **John Gosheron and Co., Ltd.,** Gayford Road, London, W.12, **Lasso Products** (proprietors: **Herts Pharmaceuticals, Ltd.**), Welwyn Garden City, Herts, and **Samuel Jones and Co., Ltd.**

Packaging Services

Some of the most interesting exhibits were shown by packaging service firms, i.e., those companies which take bulk products from manufacturers and produce unit packages ready for dispatch. Such a service, developed for pharmaceutical purposes, is the "Sealtite" unit packaging system of **Ivers-Lee (Great Britain), Ltd.,** Slough, Bucks, using transparent cellulose, heat-sealing types of cellulose acetate and cellulose acetate metal foil laminates to produce an envelope into which a number of tablets are sealed individually. A development of this system, for packaging weighed quantities of material in powder form was shown in action on the stand.

Charles E. Douglas, Ltd., provide another version of these unit packs in their "Nicolle" pack. They make use of semi-rigid cellulose acetate sheet and it may be used for packing irregular-shaped articles by use of perforated sheets as can be seen by the photograph on the facing page of engineering components and pencils in individual packs.

Methods of packaging liquids and pastes in thermoplastic materials have been developed by **Technopol Laboratories, Ltd.,** Siddons Lane, Baker Street, London, N.W.1. The high-frequency p.v.c. sealed sachets used to pack Pears' "Gloria" shampoo are made by this company, and development work now in progress will enable food (e.g., coffee, cream, etc.) to be similarly packed in polythene bags. Collapsible tubes for creams and pastes are also made by this process.

Hunt Partners, Ltd., Theydon Road, Clapton, London, E.5, produce a range of "Phantox" bags from clear cellulose acetate sheet. These are moulded to take the shape of the product for which they are intended. A selection is shown on page 65. Cellulose acetate boxes are also produced by **Cascelloid, Ltd.,** Abbey Lane, Leicester. This company manufactures polythene squeeze bottles, various types of injection-moulded containers and bags made from polythene lay-flat tubing.

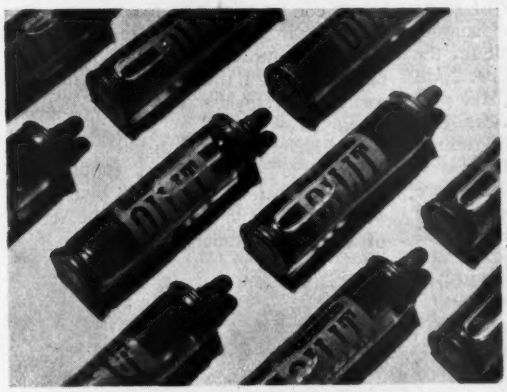
Chiltern Paper Products, Ltd., Hemel Hempstead, Herts, showed "Alkathene" drum liners and "Alkathene"-coated paper as well as spirally wound tubes and rigid boxes of cellulose acetate. Another firm of converters specializing in polythene bags and liners is **The Paper Goods Manufacturing Co., Ltd.,** 124, West Mead Road, Sutton, Surrey.

Moulded jar and bottle caps and plastic containers for inhalants were shown by **John Dale, Ltd.,** Brunswick Park Road, New Southgate, London,

The Resil pack, developed to provide shockproof packing for service and industrial products, was shown by **The Pontefract Box Co., Ltd.,** King Street, Pontefract, Yorkshire.

Plastic jar and bottle closures and inhalant containers (John Dale, Ltd.).

Collapsible tubes and liquid-filled sachets (Technopol Laboratories, Ltd.).



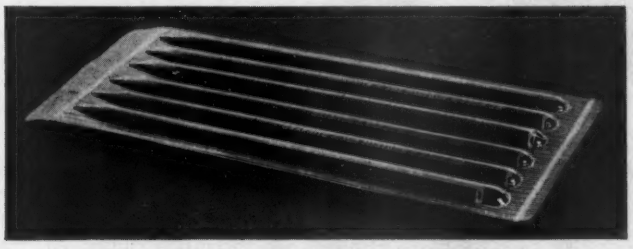
Pack for oil made by London Capsule Co. from "Clarifoil" (British Celanese, Ltd.).

Engineering components sealed in "Nicolle" pack (Charles E. Douglas, Ltd.).

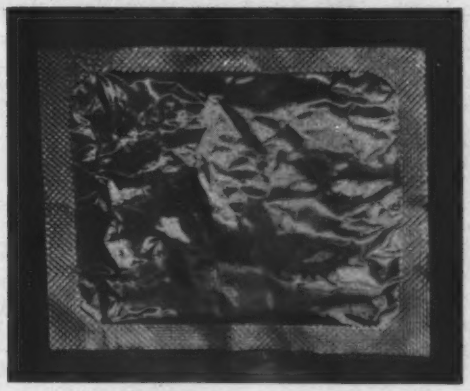
"Phantox" cellulose acetate packs (Hunt Partners, Ltd.).

Cutting tools packed in "Crocell" hot dip coating (Croda, Ltd.).

Polythene squeeze-bottle for talcum powder (Cascelloid, Ltd.).



Pencils individually sealed in "Nicolle" pack (Charles E. Douglas, Ltd.).



Aluminium/cellulose acetate foil laminate powder pack (Ivers-Lee (Great Britain) Ltd.).

Plastic Parts for a Camera and Flash Attachment

PLASTIC mouldings produced by E. K. Cole, Ltd., Plastics Division, for the new "Duaflex" camera comprise two side panels, two other mouldings for the flash attachment and the lens cover.

The left- and right-hand side panels which form the basis upon which the camera is built-up are so designed that the various parts such as spool chambers and holders, mirror, reflex, lens and film compartments, etc., are located and held in position by grooves without the necessity of screws or other conventional fixing methods. They are robust, black phenolic mouldings grained on one side to give a realistic impression of leather, the "inside" surface being a matt finish produced by dull chromium plating on the tool. The lens panel and back cover, which complete the assembly, are of alloy die-castings.

The making of the tools called for more than usual accuracy to ensure that the complicated groove system should be perfectly related to the piece parts so that no misplacing of these would affect the working of the camera. Subsequent to moulding, special rectifying fixtures are used to keep the panels dead flat, as warping would affect both assembly and correct functioning.

Threaded holes for neck-sling, small holes for film-winding mechanism, plunger for shutter action, contacts for the flash attachment, etc., and a slot for "I" and "B" button are all provided in the side panels. Almost all these items must be positioned within extremely close limits.

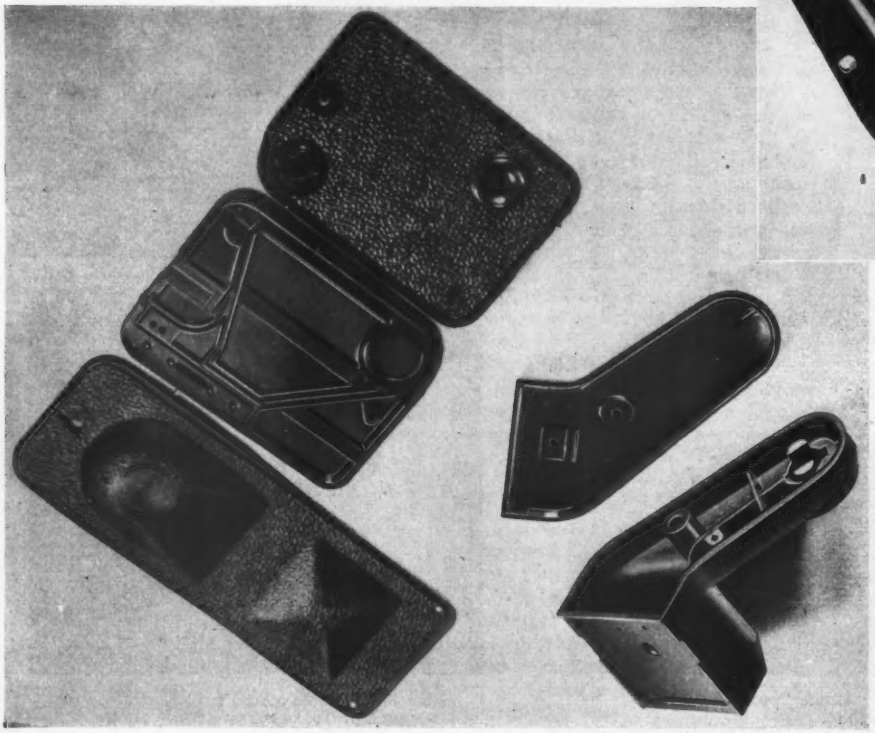
The lens cover, which provides complete protection for viewing and taking lenses and viewing screen, is injection moulded from black "Alkathene," and is tough and durable to the point of being virtually indestructible. The smooth inside surface makes it impossible for the lens to suffer damage; the cover itself will withstand harsh treatment and still provide complete protection for delicate lens surfaces. Flexibility is equal to rubber, but, distinct from rubber, the plastic contains no sulphur and cannot therefore cause blackening of the silvered viewing mirror. The outside surface is grained to emulate leather, thus making it complementary to the side panels of the camera.

A key slot at the base of the lens cover moulding engages with a stud on the camera front and the lens cover can be clipped into position by means of press studs or swung clear of the lenses in a matter of seconds. It remains attached to the camera in either position.

Each camera is specially fitted with contact points and studs for the attachment of the flash-holder, which comprises two mouldings—case and cover. These are highly polished black phenolic material. The case portion needs particular care in production because it is of complicated shape with a deep cavity to act as a battery compartment. Various fixing holes, slots, etc., for reflector, electrical contacts, switch mechanism, etc., call for extreme accuracy in positioning. The cover must be an exact fit on the case, and both must be free from distortion as single-screw fixing only is employed.

We have in these pages previously referred to camera parts moulded in phenolic material; four such cameras were illustrated in "Plastics in the Service of Man," September, 1950.

(Above) The new "Duaflex" camera, complete with flash attachment (rear view).



(Left) Left-hand and right-hand side panels for the new "Duaflex" camera, moulded in phenolic; also lens cover, injection-moulded in black "Alkathene," and two phenolic mouldings for flash attachment (E. K. Cole, Ltd., Plastics Division).

World's Industry Employs Plastics

GENERAL ENGINEERING

Plastics in aircraft. — In a symposium the following problems were discussed: low-pressure laminates, transparent materials for aircraft glazing, electrical and electronic applications and expanded materials. ("Technical Data Digest," 1950/Jan./15.)

Plastics in the textile industry.—A survey on the plastics used in this industry and their special applications has been given by F. P. Hunsicker at the A.S.M.E. Fall meeting. ("Machine Design," 1950/Oct./182.)

Directory of materials.—This year's directory of the American publication "Machine Design" contains 126 names of thermoplastics and 112 names of thermosetting plastics. ("Machine Design," 1950/Oct./252.)

Pin-point gating.—In a series of articles on design for plastics W. S. Thomas discusses this new technique in which the gate is so placed that mainly the hot central core of the material is utilized. According to American practice the opening area is only between 0.001 to 0.002 sq. in. ("Toolmaker and Precision Engineer," 1950/Dec./30.)

Cast tool plastic is said to have a minimum shrinkage. The new liquid phenolic resin produced by Durex Plastics and Chemicals Inc., North Tonawanda, N.Y., is said to be superior to previous materials and to permit economical production of tools and models without elaborate shop equipment or highly skilled personnel. ("Machinery," (N.Y.), Vol. 57, 1950/Dec./187.)

Flame-spraying torch for plastics is operated by a compressed air (50lb/sq. in.) or a gas-operated device. The surface to be covered has to be preheated to 140 to 180 degrees C. ("Industrie-Anzeiger," 1950/Dec./22/9.)

Production of testpieces.—A new edition of the German standard DIN 53457 on testing of plastics has been issued, dated June, 1950. It distinguishes between test pieces which are machined from the solid material and those produced by moulding or injection moulding. Mould temperature, pressure and time are fixed for the individual materials. (German Standards Institution, Berlin; Krefeld-Uerdingen.)

Designing parts of natural and synthetic rubbers.—E. F. Riesing discusses the factors influencing the design of components; data on spring design are given. ("Product Engineering," 1950/Dec./104.)

CHEMICAL

Plastics on polyurethane basis.—A. Hoechtlen explains the "Diisocyanate - polyaddition" process of O. Bayer and collaborators, and describes the possible field of applications of linear and combined polyurethanes. ("Kunststoffe," 1950/July/221.)

Properties of rubber-like polymers.—J. L. Hopkins has developed a simple apparatus for determining the dynamic properties of elastomers in shear at audio frequencies and gives data on shear modulus and viscosity for several elastomers. (A.S.M.E. Fall meeting Paper 50, f 24, Abstr. "Mechanical Engineering," 1950/72/912.)

Properties, manufacture and application of "Plexiglas."—F. Esser reviews the development of this material, originally developed as a safety glass. Since its technical properties have become better known, it has found interesting applications in chemical apparatus, etc. ("Kunststoffe," 1950/Oct./305.)

MISCELLANEOUS

Polyethylene for packing purposes. It is reported that the use of bottles, etc., of polyethylene increases, in particular as the material is resistant against most concentrated acids and is about 70 per cent. lighter than glass. ("Glastechn. Berichte," 1950/Nov./W.32.)

Identifying your products.—Amongst the many possibilities for nameplates, escutcheon or instruction plates, the application of plastics is quite outstanding such as the use of three-dimensional plastics, and plastic mouldings. ("Product Engineering," 1950/Dec./117.)

Adhesive bonded structures. — S. Gunthorp and R. G. Naugle give a survey of modern bonding methods between metals and non-metallic substances. ("Product Engineering," 1950/Dec./138.)

Fire hazards of synthetic plastics are reviewed by J. V. Grimaldi. The greatest hazards exist in manufacture of the resins, in the fabrication of plastic products and in the grinding of scrap plastic. Burning is not more dangerous than that of wood, woollen fabrics, or fats and oils. ("Mechanical Engineering," 1950/Dec./987.)

Mixing beaker.—A novelty for the household is a mixing beaker of transparent or coloured plastic, which is provided with a number of staggered steps. The top and the bottom also contain small projections which are said to cause turbulence of the enclosed mass and give easy mixing of liquids and powders such as cocoa or flour. ("VDI-Nachrichten," 1950/Dec./2.)

Rubber-phenolic moulding materials.—W. Goss reported recently on attempts to combine phenol-formaldehyde resins with synthetic rubber as a binder to give better impact strength without sacrificing mouldability, bulk factor and other desirable characteristics. ("Machine Design," 1950/Oct./180.)

Fast-curing phenolic resin.—Bakelite C-22 (Bakelite Div. of Union Carbide and Carbon Corp.) has a 45 per cent. faster curing rate than phenolics previously regarded as fast curing. High gloss and excellent mould-release qualities are claimed. ("Machinery" (N.Y.), 1950/182.)

Phenolic resins for brooches.—R. A. Smith and S. Hurley describe the production of brooches from "Catalin" sheet and sections by means of saws and engraving tools. ("Mechanics," 1950/Dec. 8/128.)

Adhesion of plastics.—F. Moser reports contact angle studies for predicting polarity and adhesion. Various glasses and plastics were investigated. Chemical structure appeared to have greater effect on wetting than viscosity. ("A.S.T.M. Bulletin," 1950/Oct./62.)

Plastics research at the National Bureau of Standards is reviewed by G. M. Kline. A brief outline of the work carried on in each of eight different fields of investigation is given. (N.B.S. Circular, 1950/June 15/494.)

Application of polyamides.—F. Stastny reviews the present development of commercial-obtained mixed polyamides; their chemical structure, properties, manufacture and uses are described. ("Kunststoffe," 1950/Sep./273.)

Quality tests for plastics in Germany.—Since the end of the war no official quality tests of plastics were carried out. Recently the "Technische Vereinigung der Hersteller typisierter Pressmassen und Pressstoffe" (Technical Society for the production of standard moulding powders and plastics) has been reorganized in Darmstadt, and it is intended to begin the quality survey again very soon. ("Kunststoffe," 1950/Sep./280.)

Effect of fungus growth on strength of films.—Inoculation of polyvinyl chloride films with fungi led, after six weeks, to increase in tensile strength of 63 per cent., and 67 per cent. decrease in elongation. ("A.S.T.M. Bulletin," 1950/Sep./53.)

PLASTICS
IN THE SERVICE OF MAN

A pictorial review of high-quality units moulded or otherwise fabricated in Great Britain . . .

17. Catering Equipment

(Above) The translucent property of pastel-shade "Perspex" is used with spectacular effect by internally lighting this Birmingham snack-bar counter faced with cream and maroon "Perspex." The use of "Perspex" in the overhead lighting fittings is also of interest. (Photo: I.C.I., Ltd.)

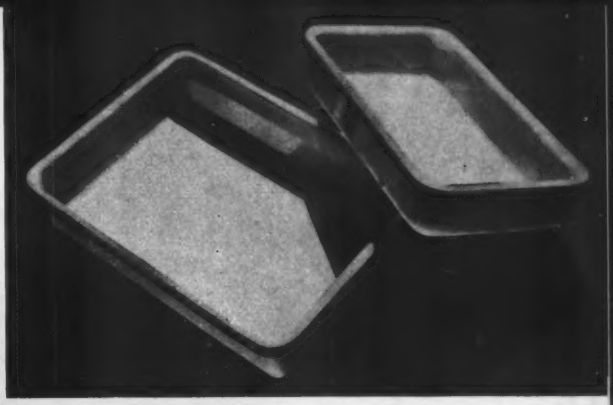
(Below) This tea-trolley in use at a London station of British Railways makes extensive use of "Perspex" components and fittings manufactured by "Triplex" Safety Glass Co., Ltd. (Photo: I.C.I., Ltd.)

(Above) The table tops of the Oxford Street restaurant of Thomas Wallis, Ltd., manufactured by Dare Engliss and Co., Ltd., are covered with "Warerite" decorative laminates, giving easily cleaned, hard-wearing sufaces. (Photo: Warerite, Ltd.)

(Below) At the Moo Cow milk bar in Victoria Street, London, the counter, bar front and canopy, as well as the walls which incorporate an interlaminate mural painting, are surfaced with "Warerite" plastic laminates. (Photo: Warerite, Ltd.)

(Below) An impressive test showing that localized heat will not mar the cigarette-proof grade of "Formica" decorative laminates is given at the bar of the Colony Restaurant, Berkeley Square, London. (Photo: Thomas De La Rue and Co., Ltd.)

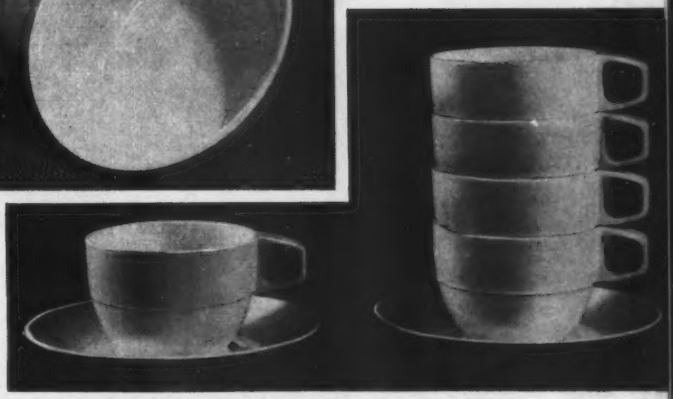
(Left) Edge-lighted signs like this one, produced by back engraving of "Perspex" sheet, find many uses in hotels, restaurants and snack-bars. (Photo: I.C.I. Ltd.)



(Above) Deep food trays for storage and display purposes, pressed from Runcolite P.49 acrylic sheet in various colours by Runcolite, Ltd.

(Below) A cream thermosetting moulding by Roanoid, Ltd., houses a vacuum flask, specially designed for use in ships of the Holland-America Line.

(Above) "Beetleware" tableware, moulded in urea materials, finds many uses in catering establishments where lightness and unbreakability are important. (Photo: B.I.P. Ltd.)



(Below) Three-course-meal tray designed by Gaby Schreiber for use in R.A.F. canteens, and produced by Runcolite, Ltd. from acrylic sheet in various pastel shades.

(Above) Moulded plastic cups and saucers, specially designed by Gaby Schreiber for easy stacking, are manufactured by Runcolite, Ltd.

(Left) Menu-card holders in "Perspex," such as this one manufactured by Sign and Display Craft, Ltd., are used extensively in restaurants and snack bars.

(Below) Two forms of the "Beetleware" condiment set moulded in urea materials by Streetly Manufacturing Co., Ltd.: on the left; stand for pepper, salt and mustard containers; on the right: stand for pepper and salt shakers only.

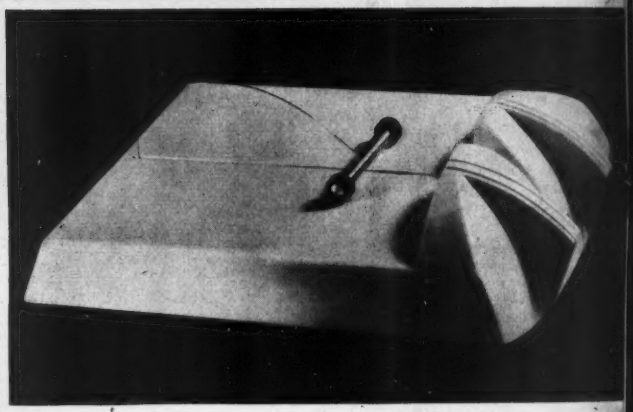
(Left) Domed food cover in transparent "Perspex" with black phenolic handle, produced by Phipps Plastics Products, Ltd. (Photo: I.C.I. Ltd.)

(Right) Food storage dishes in a wide range of sizes are manufactured from white and transparent "Perspex" by S. C. Errington (Hanwell), Ltd.

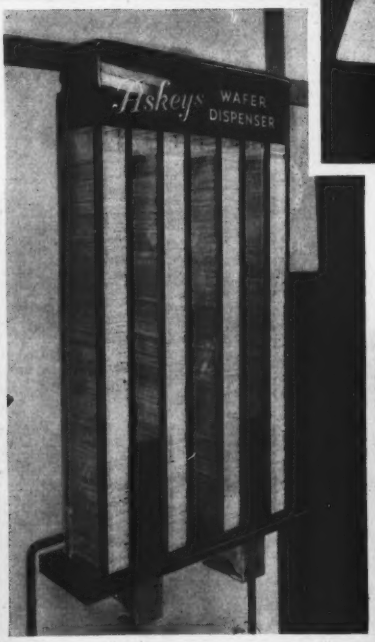
(Below) "Tygan" cloth woven from thermoplastic filament provides a tough, easily cleaned and attractive upholstery material for these bar stools. (Photo: Fothergill and Harvey, Ltd.)

(Left) Black and translucent "Perspex" was extensively used in this cocktail bar made by B. Attewell and Sons, Ltd., and seen at the B.I.F. last year.

(Below) The "Handee" cheese-cutter, manufactured by Digby and Nelson, Ltd., has recently been redesigned and now has a base moulded in white urea materials by Ashdowns, Ltd.



(Below) "Lightfoot" ice-cream sandwich dispenser (Lightfoot Refrigeration Co. Ltd.), which serves briquettes complete with wafers without any of the food being touched by hand, employs a number of "Perspex" components fabricated by Thermo-Plastics, Ltd.

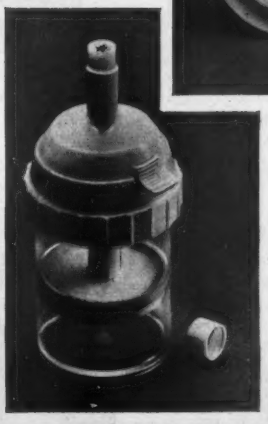


(Above) A wafer dispenser made by Lightfoot Refrigeration Co. Ltd. for "Askeys" wafers also employs "Perspex" components made by Thermo-Plastics, Ltd.

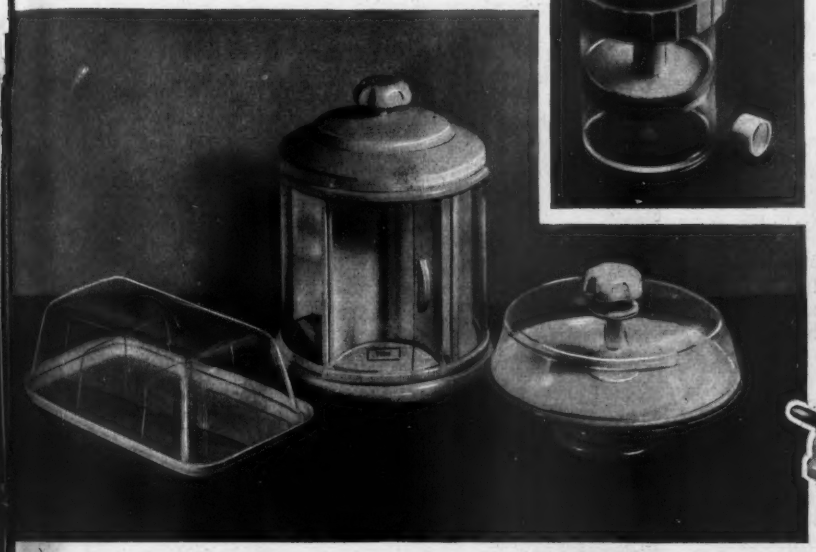
(Below) Extruded polythene piping made by Tenaplas, Ltd., is frequently used in inns and breweries for conveying beer. This photograph was taken at the 1947 Brewers' Exhibition. ("Plastics," 1947/Nov./582.)

(Above) Display and advertising signs in "Perspex" with relief lettering and decorations are manufactured by Sign and Display Craft, Ltd.

(Above) A full range of tableware is moulded in melamine material by Halex, Ltd. Besides the general sturdiness of these mouldings they are also stainproof.



(Left) Mustard is ejected from the pot moulded by Stone and Simmons in polystyrene by a push-button mechanism. The contents are thus prevented from drying and are kept free of dust.



(Above) Sandwich stand, cake stand and revolving sandwich containers, fabricated from transparent and opaque "Perspex" by Thermo-Plastics, Ltd. These are increasingly used on buffet counters to keep food protected.

(Above) Tariff board with interchangeable slides in peach "Perspex" manufactured by Lacrinoid Products, Ltd., for the Hotels Executive of British Railways.

(Left) The dejuicer parts of the "Mary Ann" kitchen mixer and dejuicer (Thorn Electrical Industries, Ltd.) are moulded in "Beetle" urea materials by W. W. Ball and Sons, Ltd.

(Above) The "Hygene" egg slicer, with components moulded in "Beetle" by Moulded Products, Ltd., is marketed by Progressive Novelty Industries (M/cr.), Ltd. (Photo: B.I.P., Ltd.)

(Below) Cups, saucers and plates moulded by Stadium, Ltd., in "Diakon" methyl methacrylate (I.C.I., Ltd.) are used by many catering firms including Forte's and Co., Ltd.

Plastics in Building—VI

By JOSEPH B. SINGER, B.Sc.(Arch.), A.R.I.B.A.

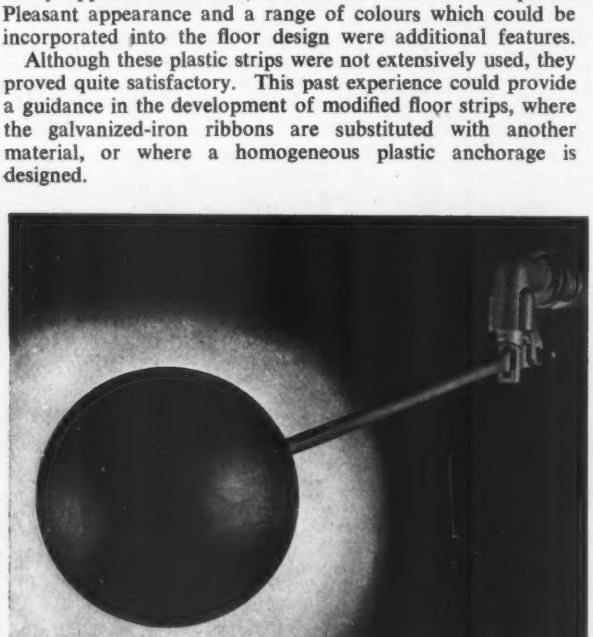
RECENT prohibitions on the use of copper and zinc, and copper alloys, aimed at conserving these metals for applications for which they are indispensable, focus the attention of the building industry on ways in which to cope with various problems that have arisen. It is generally recognized that the industry will face difficulties in respect of articles hitherto manufactured from these non-ferrous metals. The most serious consequence of the ban, however, will come from the restrictions on galvanizing, as there is at present no equally effective coating to take its place.

In this brief survey of articles normally made from what are now prohibited metals, some new openings for plastics are pointed out and suggestions are made on their possible application in view of the greatly increased demand for certain alternative building components.

Brass or zinc floor strips are usually employed for separating sections of terrazzo and other cement compositions; also to provide a decorative pattern to the floor finish. The flooring is laid by applying a coat of cement slurry, which is followed by a ¾-in. screed, divided into panels by means of brass or zinc strips. The strips are anchored into the screed with the upper part projecting to take the floor finish. When the floor composition sets, dimensional changes take place, which result in cracking. The strips have the object of localizing the cracks within a small area of the panel and practically confining them along the edges.

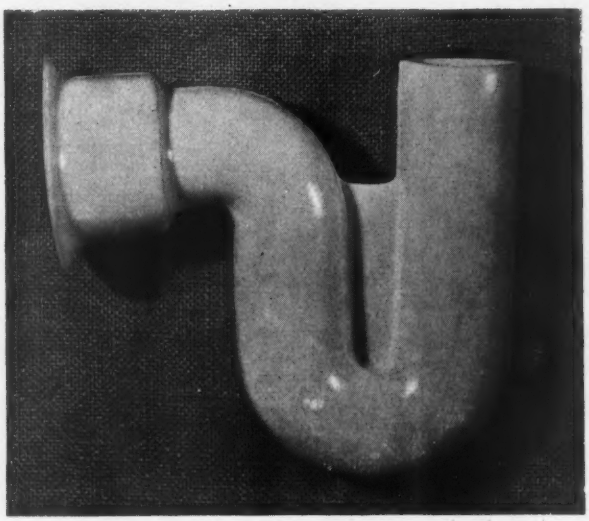
Plastic strips, to replace those made from brass and zinc, were first developed during the war. Cellulose acetate-butyrate was used for the extrusion of floor strips, which were then attached by small rivets to galvanized-iron ribbons forming the design outline for the composition floors. The depth of the strip below the floor finish was 1¼ ins. and the width showing on the surface was 5/32 in. The flexibility of these strips enabled them to be bent easily in a cold state, or by application of heat, if a smaller radius was required. Pleasant appearance and a range of colours which could be incorporated into the floor design were additional features.

Although these plastic strips were not extensively used, they proved quite satisfactory. This past experience could provide a guidance in the development of modified floor strips, where the galvanized-iron ribbons are substituted with another material, or where a homogeneous plastic anchorage is designed.



Cistern float, 4½ ins. diameter, moulded in "Onazote" (Expanded Rubber Co., Ltd.).

War-time shortages and the need for saving metals led to an investigation into the possibility of using plastics for sanitary fittings. Ball-cock mechanism, which is usually manufactured from copper or brass, works on the following principle: A float drops as the water flows out on flushing the toilet, and this movement opens an inlet valve allowing fresh water to fill the tank; the water then lifts the ball and on reaching the required level the valve is automatically closed. Such a float, made in two halves in thin copper, can easily be rendered unserviceable by a parting in the seam or by a small dent, whereas one made from cellulose acetate, moulded in two halves and cemented into a one-piece unit, avoids the danger of denting. One of the accompanying



Sink trap moulded from "Welvic" p.v.c. paste (I.C.I. Ltd., Plastics Division).

illustrations shows another very serviceable type of float—in this case made of "Onazote," which is an expanded synthetic rubber.

Plastics have also been used in flush-valve mechanism; the first part produced was the L-shaped cellulose acetate-butyrate pipe connecting the valve to the plumbing fixture. The saving in brass thus achieved on this part alone in the United States has amounted to 400,000 lb. in one year. Other parts of the valve followed, including the piston regulating the quantity of water passing through the valve. The piston body and the top plate were moulded in polystyrene and the relief valve from phenolic resin. The flush-valve body and cover had to withstand pressures up to 150 lb. and were manufactured from malleable iron, which was lined with cellulose acetate-butyrate to provide a non-corrosive surface. Finally, other brass parts, including the operating handle, the plunger and plunger bushing, were made from phenolic resins. The vacuum brake, which has the object of preventing back-siphonage from the plumbing fixture, was produced from cellulose acetate-butyrate or from polystyrene, and the transparency of the latter enabled a visual inspection of the working system.

The above examples indicate the way in which plastics can contribute not only to saving metals, but also to the development of improved plumbing fixtures.

Various types of knobs, handles and the like for door furniture are already manufactured from plastics in lieu of brass or bronze. They are produced in a range of shapes either as mouldings, as cast phenolics, or cut from bar stock. They have good wearing quality and are more pleasant to touch than is metal. Curtain rails in plastics are produced from extruded sections similar to those of metal rails; the moulded phenolic type rail, however, is more resistant than others to changes in humidity such as occur in kitchens, bathrooms, etc.

Various processes are used to provide protection to metals exposed to external influences, and particularly to the ill-effects of atmospheric pollution; these include galvanizing, vitreous enamelling, stove enamelling, etc. Corrosion-resistant metals have also been developed. Galvanizing is the most common ferrous metal protecting process used.

The possibility of using plastics as protective coatings has been investigated, and various materials have become available to fulfil different requirements. Although many plastics offer advantages in their chemical resistance, they impose certain limitations on methods of fabrication, due to their low melting point. Further, they are subject to the corrosive action of alkali and strongly oxidizing solutions, and the effect of stress and strain on the underlying metal can be detrimental to the coating.

Plastics which have already found use as protective coatings include polyvinyl resins, polythene, and phenolic resins. Thermoplastic resins can be applied in powder form by flame spraying, as in the Schori process. Prior to spraying, the metal article must be cleaned and made free from impurities, which would otherwise prevent adhesion of the coating; the best results are achieved when the surface of metal is slightly roughened, as by sand blasting. Temperature control is essential as the optimum plasticity of the material is obtained when it is close to the melting point; oxidation is reduced by keeping the temperature as low as possible. The spraying gun, fed by oxygen with propane or hydrogen, propels the softened plastic particles onto the metal surface, where they interlock and form a continuous coating. Polythene is applied in this manner to steel, and to aluminium and magnesium alloys.

Phenolic resins as corrosion-resistant coatings on metals are of a limited value, owing to the brittleness of the material and also because they are subject to attack by alkali and strong oxidizing agents. Phenolic resin compositions which contain inert fillers give more satisfactory results.

Polythene coating, applied by hot spray, can withstand impact shocks better than do phenolic resins, owing to the rubber-like flexibility of polythene. A coating obtained by the cold powder application of polythene to metal which is heated to a temperature above the melting point of polythene, i.e., 110-120 degrees C., does not adhere completely to the metal, but shrinks tightly on to it, thus giving it a protecting and enveloping layer.

Polyvinyl chloride is applied as a dispersion of p.v.c. in suitable plasticizers. In this method, the metal is first preheated, dipped in the cold liquid, then drained and stoved for a short time. This type of coating provides a tight envelope around the metal, but if repeatedly immersed in water and dried it will swell and even rupture, and is therefore precluded from external applications.

Cellulose acetate extrusion can be used as a tubing without reinforcement or, alternatively, as a coating for metals. Manufactured by British Celanese, Ltd., under the trade name of "Celastoid," it has a smooth, highly impact-resisting and hard-wearing surface. The cellulose acetate extrusions provide an effective cover to metals and have been used already on aluminium handrails and similar fixtures, where their colour range is of considerable assistance to the interior decorator. The extruded tubing is easily formed into curves and/or blown into irregular shapes to follow the outline of the metal. It is made in 10-ft. lengths with outside diameters from ¼ to 3 ins., and a minimum wall thickness of 0.030 in.

Zinc, copper, and copper alloy articles and their alternative uses in plastics, with reference to the Ministry of Supply list of prohibited uses of these metals.

General use (metals)	General use (plastics)	Experimental use	Suggested use
Curtain rails	Curtain rails	Curtain rails	—
Drawer Pulls	Drawer pulls	—	—
Flooring strips	—	Flooring strips	Flooring strips
Handles	Handles	—	—
Hangers and hooks	—	—	Metal reinforced hangers & hooks
Knobs	Knobs	—	—
Lighting fittings	Lighting fittings	—	—
Linings	Linings	—	—
Lamp caps and shades	Lamp caps and shades	—	—
Gutters and r.w. pipes	—	—	Laminated plastics or extruded plastics
Fan blades and guards	—	—	Metal reinforced
Plumbing fixtures	Plumbing fixtures	Plumbing fixtures	—
Rails and railings	Plastic extrusions over metal	—	—
Roofing sheets	Roofing sheets	—	—
Switch and bell-push plates	Switch and bell-push plates	—	—
Water pipe-lines	Water pipe-lines	—	—
Wiring fittings and accessories	Wiring fittings and accessories	—	—
Galvanised articles:			
Gutter brackets	—	—	Coated with plastics or metal reinforced plastics
Ventilators and casing	Ventilator casing	—	ditto
Tubes and fittings other than water tubes	Tubes and fittings	—	ditto
Name plates, etc.	Name plates	—	Multi-coloured plastics
Hat and coat hooks	—	—	—
Wall ties	—	—	Coated with plastics or metal reinforced plastics

Building components made in metal, e.g., window frames, door frames, roofing sheets, etc., are subject to rough handling and damage which may occur unless the protective coating is of adequate impact strength and abrasion resistance. This damage can be particularly troublesome in places which are inaccessible after fixing. These considerations have to be borne in mind, as a greater degree of serviceability and durability and many subsequent economies in the maintenance of building components can be achieved with coatings suitably chosen and correctly applied. The following factors have a bearing on the selection of appropriate coatings: (1) The material to which the coating is applied; (2) the properties required in relation to the anticipated service, e.g., chemical resistance, resistance to abrasion, etc.; (3) final appearance of the article; (4) the method of application necessitated by the type of article and facilities available.

Galvanized wall ties are among articles shown in the table of prohibited uses of copper and zinc, recently published by the Ministry of Supply. The banning of this item is regarded as disastrous, since there is no alternative material available, and the disproportionately short life of this unprotected building component is foreseen to have grave consequences. In general, brick walls are built from two thicknesses of brick with a 2-in. air cavity. The outer and inner bricks are bonded with wall ties made from galvanized steel or wrought iron or copper alloys, spaced about 3 ft. apart horizontally and 1 ft. 6 ins. vertically. Their design is similar in shape to the numeral 8, in order to give maximum bearing area and bonding strength, and to prevent condensed moisture passing from the outer to the inner leaf of the wall. It appears to be a feasible proposition to manufacture such wall ties from some suitable plastic, although extensive preliminary tests are necessary to make certain that the material chosen will not be attacked by lime in the mortar, as also by acids and salts that may find their way into bricks. The ties are inaccessible after the wall is built, and therefore a guarantee would be required that they would not perish, since this would affect the stability of the structure.

(To be continued.)

LETTERS TO THE EDITOR

Correspondents are reminded that a stamped and addressed envelope should be enclosed in all cases where a personal answer is desired. It is understood that any letter received may be published at the discretion of the Editor.

Plastics Supplies

SIR,—We read with great interest your Editorial in the February issue, "Plastics versus Metals," and particularly your remarks on the danger of a black market developing in plastic materials.

It would appear to us that there are indications that such a black market already exists.

In view of the present shortage of all moulding materials, we have reached the very definite conclusion that unless some form of control of material is introduced, the moulding industry will rapidly become chaotic.

We would advocate the reintroduction of the control system which operated so successfully during the last war.

It is to our certain knowledge that it is possible for firms or individuals who have not previously engaged in moulding to purchase supplies of moulding powders whether they have any plant or not.

It would seem to us that since there is not sufficient material available fully to occupy established manufacturers, that it is against the national interest to increase the channel of distribution. To further increase the potential output of an industry already short of materials is a futile waste of premises, machinery and labour.

PUNFIELD AND BARSTOW (MOULDINGS), LTD.
N. B. Punfield,
Managing Director.
Westmoreland Road,
Queensbury, N.W.9.

Cattle Drinking Bowls

Sir,—We are manufacturers of cattle drinking bowls, which normally are galvanized. In order that we may be fully prepared for shortages of material that may occur in the future, we are anxious to investigate the possibilities of alternative protective coverings for these bowls. We would, therefore, be greatly obliged if we could contact some firm or process for providing a plastic covering.

JAMES CLAY (WELLINGTON), LTD.
Ketley, Wellington, Shropshire.

[EDITOR'S NOTE: The production of a coating of polythene by flame spraying might offer a convenient alternative to galvanizing. This coating is extremely tough, it is non-rusting itself, and will prevent the rusting of the iron or steel to which it is applied; further, polythene is non-toxic and would appear to be very suitable for the purpose in view. Details of the flame spraying technique can be obtained from Schori Metallising Process, Ltd., Brent Crescent, North Circular Road, London, N.W.10. As an alternative to coating with polythene, the bowl itself could be made entirely from polythene by moulding.]

Acrylic Lenses

Sir,—Could you put us in touch with a source of information regarding present-day technique in the moulding of acrylic material for optical purposes.

DAVIDSONS ENGINEERS (MANCHESTER), LTD.
Hayes Works,
Garratt Street,
Manchester, 10.

[EDITOR'S NOTE: There are two manufacturers of acrylic lenses in this country. Combined Optical Industries, Ltd., Slough, mould from "Perspex" or "Transpex" sheet, using optically perfect metal moulds, mainly for the production of spectacle lenses, also certain types of camera lenses. I.C.I., Ltd., Plastics Division, Welwyn Garden City, Herts, make very large lenses for television projection, and employ very carefully ground glass moulds in which the acrylic monomer is polymerized by ultra-violet light. An article on "Modern Applications of Plastics Optical Materials," by Dr. David Starkie, was published in "Plastics," March, 1947 (page 117.]

Moulding Musical Instrument Cases

SIR,—One of our clients in Australia has asked us whether we have any knowledge of a press for moulding musical instrument cases. They have heard that such a press is being imported into Australia by one of their competitors and are anxious to find out as much as possible about it, with a view to considering the purchase of a machine for themselves. We are afraid the information is very vague, but we are of the opinion that it is a press utilizing one of the sheet plastics to mould the various shaped carrying cases.

SPICERS (EXPORT), LTD.
Machinery Department.
19, New Bridge Street,
London, E.C.4.

[EDITOR'S NOTE: It is likely that these cases would be best produced from resin-impregnated fabric, or laminated material, by what is generally called the "rubber-bag" technique. Information on this process, especially where the use of low pressure resins are involved, can be obtained from I.C.I., Ltd., Plastics Division, Welwyn Garden City, Herts, or from Scott, Bader and Co., Ltd., 109, Kingsway, London, W.C.2. The shape of the case might also be amenable to what are called the post-forming phenolic laminates, in which case Bakelite, Ltd., 18, Grosvenor Gardens, London, S.W.1, would give full details.]

Synthetic Sponges

Sir,—I am interested in obtaining supplies of synthetic sponges made from a resin base as opposed to the cellulose type. I am told that large pieces of a material of this type are used in the aircraft industry, and that the waste resulting from the punching of large holes in this material comes on the market in the form of sponges.

Sneyd Mills, E. SYDNEY HEATH.
Edward Street, Burslem,
Stoke-on-Trent.

[EDITOR'S NOTE: The material to which our correspondent refers is possibly "Formvar."]

Plastic Boxes

Sir,—Could you put me in touch with a firm which has a stock line of plastic boxes with tight-fitting lids? Preferably, they should be rectangular, but round boxes might be acceptable; the size required is about 2½ ins. by 3½ ins.

Kenython, R. W. WOOLLARD.
Bridle Path, Parkstone, Dorset.

Bookbinding Material

Sir,—We have received an inquiry from Australia for bookbinding material similar to the sample sent with this letter, and shall be glad to have the names and addresses of manufacturers.

E. W. CARLING AND CO., LTD.
5, Laurence Pountney Hill, E. C.4.

[EDITOR'S NOTE: The sample submitted by our correspondent appears to be a fairly thick p.v.c coated paper.]

Plastic Sheeting and Adhesive

Sir,—We are interested in obtaining a supply of transparent plastic sheeting as per sample (1½ thou.) in rolls about 18 ins. wide; also suitable adhesive for joining this material to itself and to paper.

LOVELL'S LIBRARIES, LTD.
33, Battersea Rise, S.W.11.

Battery Container

Sir,—On page 47 of the February issue of "Plastics" we notice the reference to the LPM-4 Exide unspillable moulded polystyrene container of Chloride Batteries, Ltd. We would ask you to be good enough to mention that all the moulded parts of this container are moulded by this company.

PUNFIELD AND BARSTOW (MOULDINGS), LTD.
Westmoreland Road,
Queensbury, N.W.9.

Plastic Shot

Sir,—We would be obliged if you could furnish us with any information regarding the possibility of obtaining plastic spheres in the order of 1/32-in. diameter. They are required for the shot peening of light alloys and 1 cwt. would probably meet our requirements. We believe that the manufacture of plastic shot for peening operations is carried out in the United States, but we have no knowledge of it in this country.

ARMSTRONG SIDDELEY MOTORS, LTD.
Coventry AL/Laboratory.

New Productions

Protection Cover

Hellermann Electric, Ltd., Crawley, Sussex, use their "Helvin" p.v.c. to make special covers to give protection against personal injury by implosion while operatives are engaged in processing cathode-ray tubes. These covers are used as soon as the tube is evacuated and therefore dangerous, and are not removed until all operations are complete and the tube is ready for dispatch. The dish-shaped part also serves a separate useful purpose in protecting the ground face of the tube against damage by abrasion.

Vent Plug

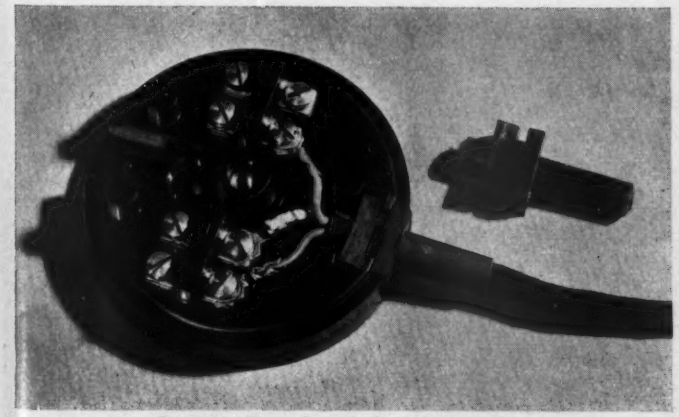
Attractive, cream-coloured vent plugs, which form a pleasing contrast to the polished black battery lids, are now being fitted to all "Exide" batteries. These plugs, which are extremely efficient in operation, are made of polystyrene. The plugs have been designed most ingeniously and embody an even more efficient non-splash arrangement than the existing "Exide" porcelain plugs, internal baffles being so constructed that they return all acid spray to the cell. There is also provision for the free passage of any gases, with horizontal outlets to avoid clogging by dirt. The plug consists of two separate mouldings, which are cemented together in manufacture.

Protection cover.

Grommet Sleeve

Probably the most common application for "Vybak" flexible moulding compounds is the production of grommets and grommet sleeves which are used where cables have to be conducted through metal panels or into electrical appliances. Their natural resilience ensures that cables will not be frayed, and their general resistance to abrasion gives an assurance of long life. For electric irons, refrigerators, and other portable electrical appliances the use of grommet sleeves for carrying the power cable strikes the correct balance between rigidity and flexibility—the sleeves are stiff enough to throw the cable clear of the appliance, and at the same time they are sufficiently flexible to facilitate fixing and to hold the cable (once fixed) under tension. Further, the double flange on the sleeve eliminates any danger of its being pulled out while the appliance is in use. A similar sleeve, used in Holland for telephone junction box leads, is shown in the photograph (courtesy, Bakelite, Ltd., and Hellermann Electric, Ltd.).

Television aerial rod tips are also produced in "Vybak" flexible moulding compounds. Here the weathering properties and water resistance of the material are especially important, as the principal purpose of these tips is to prevent water seeping down the inside of the aerial rods.



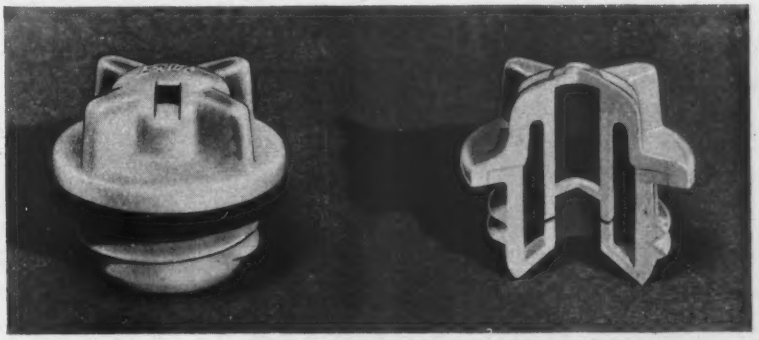
Grommet sleeve for telephone junction box.

Knife Handles

For many years, nitro-cellulose has been employed for making knife handles. It gives a very attractive handle, which is easy to fabricate and which can be readily assembled on the tangs of the steel knives. Such handles, however, have disadvantages; they tend to yellow with age, are extremely inflammable, and warp if put into hot water.

Handles made of "Diakon," while retaining the advantages of cellulose nitrate, have very largely overcome these difficulties. When moulded from heat-resistant "Diakon," they withstand the heat of washing-up water, have little or no tendency to change colour, and although they will burn, the hazard of inflammability is considerably reduced.

"Diakon" is an injection moulding material, and handles can be fitted in the moulding process if the cutler holds bolster dimensions to sufficiently close tolerances. Alternatively, the handles may be moulded without the "inserts," and the knives fitted in a subsequent operation. In this case a hole is left in the moulding, the tang is heated to a temperature which will just soften the "Diakon," and is then inserted, pushed home and cooled. Here it is essential to allow the air to escape and this is achieved by moulding the hole with a hexagonal cross section to take a round tang. Using this method, there is a saving of moulding material, and the handle can be balanced by introducing a weight into the hole before inserting the blade.

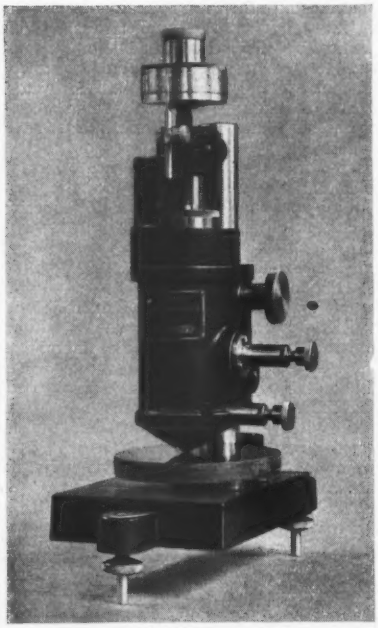


Vent plug for "Exide" battery.

Knife handles moulded in "Diakon."

PRODUCTION NEWS

Raw Materials, New Plant, Works Organization, Control Apparatus, Research, Personal and Trade Notes



HARDNESS TESTER. — The "Duro-Micromètre," here illustrated, has been specially designed for testing the hardness of rubbers, plastics, and similar materials. It measures the penetration, in hundredths of a millimetre, using a 10 mm. diameter ball under a load of 1,000 grams. The recovery factor of the material under examination, as well as its permanent deformation, may be measured. Balls of ¼ in. or ½ in. diameter may be used if desired. The test pieces should have two plane parallel sides, or otherwise be in the form of a cylinder, but special devices can be fitted to hold other shapes. The instrument is supplied by Binney and Smith and Ashby, Ltd., 116, Cannon Street, London, E.C.4, who are sole distributors in the U.K. for Appareils, Lhomme and Argy, of Paris.

CAMBRIDGE INSTRUMENT CO., LTD., 13, Grosvenor Place, London, S.W.1, have just issued a new folder (No. 65A) giving particulars of their latest types of mercury-in-steel thermometers for temperature indicating or recording at a distance in various ranges up to 1,000 degrees F. or 600 degrees C. In their combined indicating and recording thermometer, where desired, a bold scale can be fitted to the glass window, with an additional pointer operating from the recording mechanism to indicate the temperature. This fitting is of particular value when it is desired to read the instrument at a distance.

LYONS INTERNATIONAL FAIR will be held from Saturday, March 31, to Monday, April 9, 1951, both dates inclusive. Visitors holding British passports require no visa, but should apply for a special buyer's card. Inquiries for this card should be addressed to the official representatives, Robert Brandon and Partners, Ltd., 47, Albemarle Street, London, W.1, from whom further information is available concerning the Fair.

LEIPZIG TRADE FAIR will be held March 4-11. Particulars may be obtained on application to London Chamber of Commerce, Anglo-German Section, 69, Cannon Street, E.C.4; Edinburgh Chamber of Commerce and Manufacturers, 25, Charlotte Square, Edinburgh, 2; and Exhibitions and Fairs Division, Board of Trade, Lacon House, Theobald's Road, London, W.C.1.

SCIENTIFIC INSTRUMENTS EXHIBITION.—The Physical Society's 35th annual exhibition of scientific instruments and apparatus will be held at the Royal College of Science, South Kensington, London, April 6-11. This exhibition is unique in showing side by side the work of academic scientists, commercial instrument makers, and research workers in Government and other laboratories. A handbook, containing full descriptions of all the exhibits, will be obtainable from the Physical Society, 1, Lowther Gardens, Prince Consort Road, London, S.W.7, early in March.

INDUSTRIAL DESIGN.—The Midland Industrial Designers' Association has arranged a public discussion meeting, to be held on March 9, jointly with the Birmingham Publicity Club, when Mr. E. C. Mackenzie, managing director, Sir William Crawford and Partners, Ltd., will speak on "Industrial Design and Publicity." The meeting will be held at 7.15 p.m. in the Imperial Hotel Temple Street, Birmingham. Admission is free, but tickets must be obtained in advance from the Secretary of M.I.D.A., Mr. D. H. Woodfull, 47, Farnol Road, Yardley, Birmingham, 26.

INSTITUTE OF HANDICRAFT TEACHERS is holding its annual National Conference for 1951 at Hendon Technical College, The Burroughs, London, N.W.4, March 24 to 28 inclusive. The Conference includes an exhibition displaying a wide range of all kinds of craftwork from the schools and colleges of Middlesex and Hertfordshire. Exhibits will also be staged by the Council of Industrial Design, British Standards Institution, and other bodies. Trade exhibitors will display hand and machine tools suitable for craftsmen in wood, metal and plastics. Further particulars can be obtained from Mr. W. H. Warburton, 44, Leith Road, Wood Green, N.22.

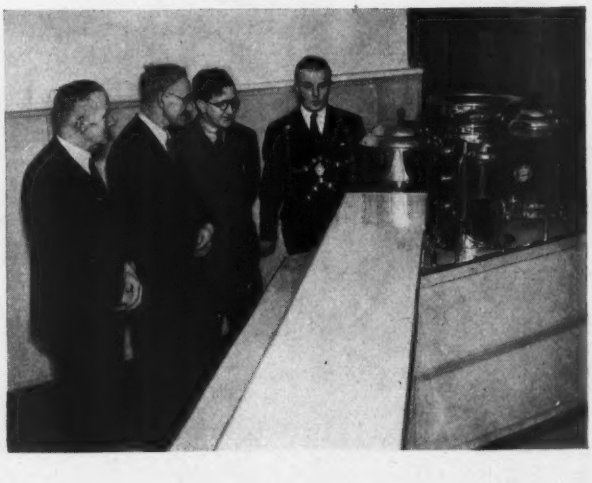
PLASTICS IN FURNITURE. — The Technical Information Service of the Furniture Development Council, 11, Adelphi Terrace, Robert Street, London, W.C.2, has commenced the issue of a technical bulletin comprising summaries of articles and reports which have recently appeared in the trade, technical and scientific Press, or which have been received from manufacturers and other sources in this country or abroad. The range of subjects covered by these summaries includes the use of plastics in the making of furniture. In the first number of this Technical Bulletin we notice references to decorative laminates, plastic-finished panelling, high polymers for textile fibres, embossed leathercloth, plastics furnishing fabrics, etc.

GAUGE AND TOOL MAKERS' ASSOCIATION.—The next quarterly luncheon arranged by the Association will be held on March 21, at the Savoy Hotel, London, W.C.2, at 12.30 for 1 p.m. The guest of honour and chief speaker will be Lord Llewellin.

PATENTS IN EGYPT.—All holders of existing patent rights in Egypt are reminded that under the terms of Article 55 of Law No. 132 of 1949, a new application for registration must be filed within two years of the date of application of the law, i.e., before November 24, 1951. Unless such applications are filed within the specified time limit, patent rights will no longer obtain and no claim for indemnity can be made.

BOARD OF TRADE.—The Central Price Regulation Committee has moved to Clive House, Petty France, London, S.W.1 (Telephone, Abbey 8010).

SCARCE ORGANIC CHEMICALS.—L. Light and Co., Ltd., Poyle Trading Estate, Colnbrook, near Slough, Bucks, have sent us a copy of their 1951 list of fine organic chemicals. This new edition contains over 1,800 items, many of which have not been previously available to research workers.



Alderman T. Sandland, Mayor of Dunstable, inspects a cafeteria for use on civic occasions, fabricated in grey linette "Formica" and presented to the town by the directors of Dunstable Showcases, Ltd. With the Mayor are (left to right): Alderman A. W. Banks, deputy mayor; Mr. F. Kenworthy, chairman, Public Health Committee; and Mr. A. Bishop, senior sanitary inspector.

PHTHALATE PLASTICIZERS.—A. Boake, Roberts and Co., Ltd., inform us that owing to the increased cost of phthalic anhydride and higher manufacturing costs, the selling prices for phthalate plasticizers were advanced on February 1, 1951, as follows:—

	per lb.
Diamyl phthalate	2s. 9½d.
Dibutyl phthalate to B.S. 573:1950	2s. 0½d.
Diethyl phthalate to B.S. 574:1950	1s. 10½d.
Dimethyl phthalate	1s. 9½d.
Diethylhexyl phthalate ...	3s. 0d.

These prices apply to 5-ton lots, and are increased ½d. per lb. for 1-ton lots.

Similar price changes for diamyl phthalate, dibutyl phthalate, diethyl phthalate and dimethyl phthalate have been announced by British Industrial Solvents, Ltd. In addition, this company announces that the price of dioctyl phthalate is increased to 3s. per lb. for "Bisoflex" 81 and to 2s. 10d. per lb. for "Bisoflex" 82.

TRAINING FOR INDUSTRY.—The Scientific Film Association has organized a conference on "The Use of the Film in Training for Industry," to be held at the Hotel Majestic at St. Anne's-on-Sea, Lancs, during the week-end March 30/April 1, 1951. Although a number of professionally made films will be shown, there will also be a number of amateur-made examples. The fee for the Conference and registration is one guinea. Further information can be obtained from the Secretary, Scientific Film Association, 4, Great Russell Street, London, W.C.1.

ERINOID, LTD., have appointed R. H. Cole and Co., Ltd., 2, Caxton Street, Westminster, S.W.1, as their sub-agents for sale of Erinoid polystyrene, which is manufactured by Styrene Products, Ltd., Partington Industrial Estate, Urmston, Manchester.

BRITISH MOULDED PLASTICS, LTD. Mr. H. E. Hill has resigned from the board of directors of this company and its associates as from January 30, 1951.

DE LA RUE EXTRUSIONS, LTD.—Thomas De La Rue and Co., Ltd., announce that to facilitate the operation of their industrial group, their wholly owned subsidiary company, De La Rue Extrusions, Ltd., has been placed in voluntary liquidation and its assets and liabilities taken over by the parent company. The business will in future operate under the Plastics Division of Thomas De La Rue and Co., Ltd. This change of status of De La Rue Extrusions, Ltd., will in no way affect the continuity of the business and no change in personnel will be involved.

STERLING MOULDING MATERIALS, LTD., announce that their new address is 8, Heddon Street, London, W.1. (Telephone: Grosvenor 5301).

PLASTICS INSTITUTE TRANSACTIONS.—Mr. Cooper, of Expanded Rubber Co., Ltd., 675, Mitcham Road, Croydon, Surrey, wishes to obtain the following issues of Plastics Institute Transactions in order to complete his files: No. 3 (January, 1933), No. 5 (January, 1934), No. 7 (January, 1935), No. 10 (June, 1936). He will be obliged to hear from any reader of "Plastics," who may have these for disposal.

STYRENE PRODUCTS, LTD.—Mr. P. C. Chaumeton, B.Sc., F.R.I.C., M.I.Chem.E., has been appointed managing director of this Company.

O. AND M. KLEEMAN, LTD.—The directors of O. and M. Kleemann, Ltd., have now decided to issue the 200,000 5½ per cent. cumulative redeemable preference shares of £1 each in accordance with the resolutions passed at the extraordinary general meeting of the company on December 19, 1950. Singer and Friedlander, Ltd., have underwritten the issue and provisional allotment letters to stockholders on the company's register are in the proportion of two preference shares at 21s. for every £1 of ordinary stock held.

WALLINGTON WESTON AND CO., LTD., Frome, Somerset, announce that Captain O. P. Dawnay has resigned from the board, on which he has sat since 1948. He is taking up an appointment as private secretary to H.M. the Queen.

STERLING MOULDING MATERIALS LTD., and Sterling Plastics, Ltd., announce that their joint address is now Sterling House, 8, Heddon Street, London, W.1. Telephone: Grosvenor 5301-5.

INDUSTRIAL PLASTICS, LTD., announce that the address of their new offices is Piccadilly House, 16-17, Jermyn Street, London, S.W.1. Telephone: Grosvenor 2848-9.

SHELL CHEMICALS, LTD., announce that Mr. A. J. M. Harris has been appointed manager of their publicity department in succession to Mr. P. C. Drake, who is now undertaking special managerial work in the Company's agricultural activities.

Cyril Last, of Bakelite Ltd., chairman, Plastics Industry Golfing Society; chairman, British Plastics Federation Publicity Committee; past-president and Founder Fellow of the Plastics Institute.

This drawing was made by Fred May, the well-known cartoonist.

A. BOAKE, ROBERTS AND CO., LTD., inform us that Mr. A. R. Lawrence, their export representative, is at present on his regular trip to the Mediterranean countries and the Levant. He is visiting Egypt, Cyrenaica, Tripolitania, Malta, Tunisia, Algeria, Morocco and Gibraltar.

MOULDING POWDER IMPORTS.—The British Plastics Federation reports the following details of private account imports of moulding powder for December, 1950:—

Licences issued:	tons
Cellulose acetate-butyrate (U.S.A.)	13.25
Polystyrene (Canada)	83.1
Polystyrene (Germany)	—
Arrivals:	
Cellulose acetate-butyrate (U.S.A.)	0.05
Polystyrene (Canada)	42.05
Polystyrene (Germany)	—

HORNERS' COMPANY.—Mr. T. C. Sutcliffe has been elected Master, Mr. R. B. Hilton as Upper Warden, and Mr. John Seyfried as Renter Warden for the ensuing year of the Worshipful Company of Horners.

SIR HARRY HARLEY, chairman of the Coventry Gauge and Tool Co., Ltd., died suddenly at sea on January 18. He had been in indifferent health for some time and left England on January 12 with the intention of spending five months' convalescence in Australia.

Sir Harry was one of the founder members of the Gauge and Tool Makers' Association, and was president of this Association from its inception in August, 1942, until March, 1947.

Forthcoming Meetings

Mar. 20.—"Some Factors Affecting the Solubility of Polymers," by Dr. P. A. Small (I.C.I., Ltd., Plastics Division). Society of Chemical Industry, Plastics and Polymer Group, 26, Portland Place, London, W.1.

Mar. 29.—"Recent Advances in Extrusion Machinery," by Mr. E. Crook. Plastics Institute, London Section. Waldorf Hotel, Aldwych, London, W.C.2.

Mar. 30.—Works visit to United Ebonite and Lorival, Ltd., Bolton, Plastics Institute, North-Western Section.

Mar. 30.—"Rheology," by H. A. Nancarrow (BX Plastics, Ltd.). Plastics Institute, North-Western Section.

Apr. 2 and 3.—Symposium on "Applications of Colloid Science to Industry." Society of Chemical Industry London Section. Joint meeting with London and S.E. Counties Section, R.I.C.

Apr. 3.—"Acrylic Lighting Fittings," by P. H. Collins (I.C.I., Ltd., Plastics Division). Plastics Institute, North-Eastern Section.

Apr. 4.—To be arranged. Plastics Institute, Yorkshire Section.

Apr. 11.—"Petroleum By-products," by B. V. Potter. Plastics Institute, Southern Section, and Institution of the Rubber Industry, Polygon Hotel, Southampton.

Machines for the Industry

Finney Dual Transfer Moulding Machine

Finney Presses Ltd., Berkley Street, Birmingham, were pioneers in the construction of dual units for compression moulding. In this article of our series, "Machines for the Industry," we describe their latest dual transfer unit.

THE Finney dual transfer moulding machine is entirely self-contained; is all-hydraulic in operation; and can be equipped with either hand- or foot-operated valves for semi-automatic operation, or with solenoid valves for automatic operation. For convenience, only one-half of the dual machine is shown in the "exploded" drawing which draws attention to the main constructional features.

Constructional Features

The unit consists of two 50-ton upstroking presses of the fully guided four-column type, each press having two pull-back rams, together with adjustable stripper gear by means of hanger bars. The moving lower platen is jig bored to take the four column guides, and machined to fine limits to ensure parallelity between the top and bottom platen faces. The top, fixed platen is incorporated in the bolster (12), which is electrically heated and contains the machined transfer plunger "pot."

Designed for pellet operation, the bolster has been so arranged and heated that a considerable degree of pellet pre-heating can be achieved, thus increasing the speed of operation. A new development is the inclusion of low-induction coil-heated hotplates if required, instead of the usual resistance type—these offer a saving of approximately 50 per cent. in current consumption, which is a further substantial saving in cost of operation. The resistance-type heating is of a patented design which offers a very high thermal efficiency.

The transfer unit is mounted separately on the crosshead of each press and is easily accessible for adjustment. The

1.—Motor starter.
2.—Hotplate splitter switch.
3.—Transfer plunger.
4.—Speed-control valve for transfer cylinder
5.—Speed-control valve for main cylinder.
6.—Pump (concealed by casing).
7.—Automatic relay valve.
8.—Transfer cylinder.
9.—Process timer.
10.—Coley temperature controllers.
11.—Pressure gauge.
12.—Bolster.
13.—Top mould.
14.—Bottom mould.
15.—Bottom hotplate.
16.—Main cylinder.
17.—Pull-back cylinder.
18.—3 h.p. squirrel cage motor, 1,430 r.p.m.
19.—Foot-operated control valve for main and transfer cylinders interlocked (20) with guard.

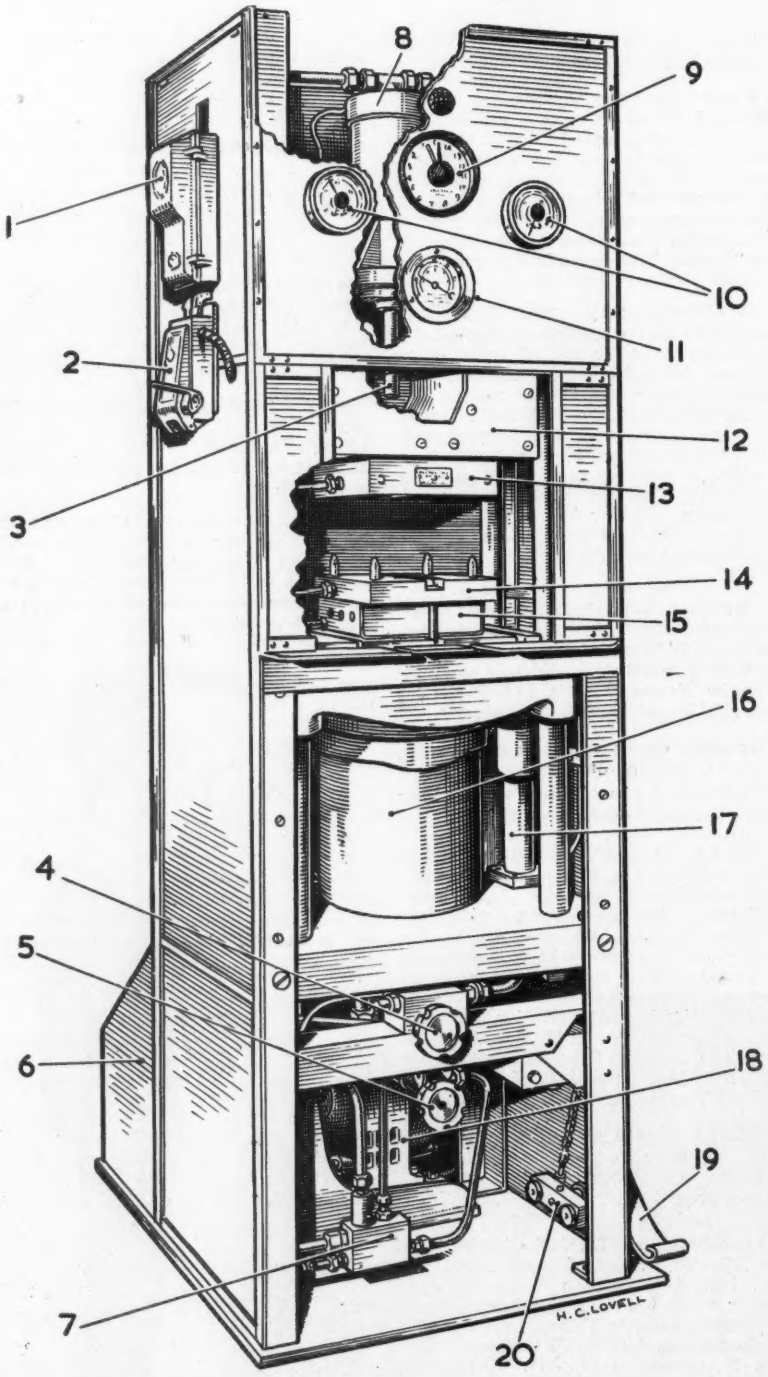


Fig. 1—The Finney transfer moulding press. The dual machine described in the accompanying article comprises two of these units side by side, as seen from the photograph (Fig. 4).

unit is actuated by a reciprocating pump of a very flexible design, which has an output of 12 gallons per minute at 500 lb. per sq. in. low pressure, and 1¼ gallons per minute at high pressure, varying from 2,000 to 3,000 lb. per sq. in. This is achieved by employing only a 3 h.p. motor and is indicative of the economy of operation.

The pump unit is carried in the base of the press, and the unique hydraulic control system makes it possible for each press to operate at different pressures and as entirely individual units. By means of isolating valves, the transfer

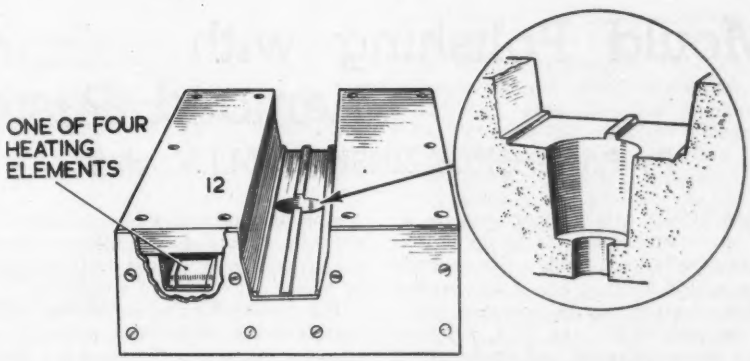


Fig. 2 (above)—Details of bolster.

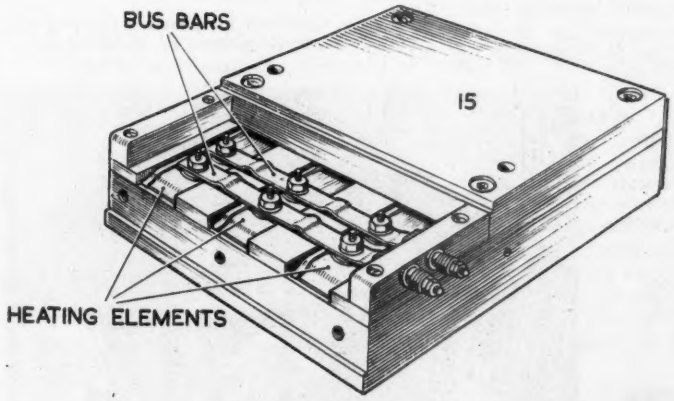


Fig. 3 (above)—Details of bottom hot-plate, showing electric heating elements.

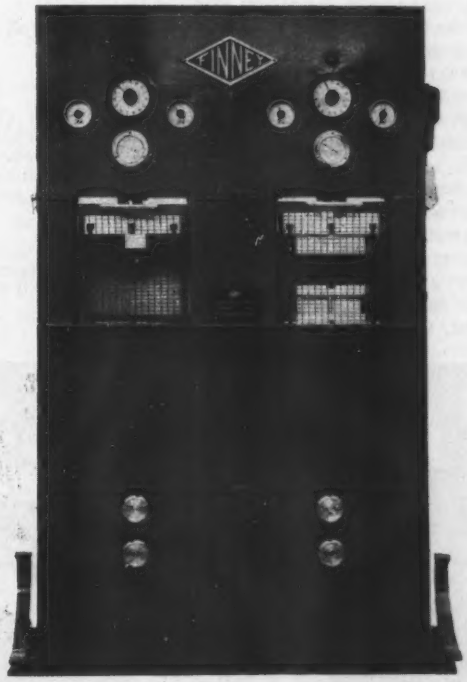


Fig. 4 (right)—The Finney dual transfer moulding machine.

units can be isolated and the press used as a simple compression machine, if desired. The unit is completely panelled and interior lighting is provided at the side of each press.

As regards the general details, the machine incorporates automatic time control; automatic cycle control; foot-operation to free both hands; automatic interlocking guards; separate pressure regulators to each press; separate transfer disabling mechanism enabling either press to be used as a normal upstroking unit; "T"-slotted platens; and adjustable stripping gear.

The general specification is as follows: Working pressure, 1 ton per sq. in.; clamping pressure (upstroke), 50 tons; cylinder stroke, 6 ins.; pull-back cylinders, 5.5 tons; daylight, 14 ins. or 16 ins.; platen area, 16 ins. by 16 ins.; speed of approach, 1 in. per second; plunger working pressure, 1 ton per sq. in.; plunger load, 12 tons; plunger stroke, 6 ins.; plunger diameter, 1.5 ins.; plunger speed of approach, 2.5 ins. per second; plunger speed of return, 4 ins. per second; capacity, 3½ oz. (100 grams).

Control Features

Two types of control—automatic or semi-automatic—can be fitted. Automatic control is accomplished by means of electric solenoid operated valves, combined with pressure switches and timers. The closing of the safety gate in this system starts the cycle by means of limit switches. These energize the solenoid-operated valve admitting pressure to the clamping cylinder (16). The ram moves up and closes the top and bottom forces of the mould. Pressure in the cylinder builds up until the set maximum is reached on the gauge, and by means of the automatic relay valve (7) the transfer plunger is brought into operation.

The process timer (9) is energized and starts timing. When this times out, it de-energizes the solenoid-operated valve of the main clamping cylinder (16), the relay valve (7) retracts the transfer ram, the clamp opens by means of the pull-back rams, and the safety gate can then be opened for removal of the moulded article.

Semi-automatic control is accomplished by means of a foot-operated valve (19) interlocked with the safety gate. In operating the machine under these conditions pellets are fed into the bolster cavity (12) and allowed to remain there for a few minutes in turn. This cavity is grooved in order to allow the pellets to slide easily into the transfer plunger guide (3). The interlocking guard is closed manually, and the press is operated by exerting foot pressure on the valve pedal of the standard valve, or by actuating the solenoid on the new-type valve.

At the end of the cycle the transfer plunger retracts and the clamping pressure is released. The guard is then dropped manually for the extraction of the moulded article, and must be closed before the next cycle can commence.

The clamping ram is returned by hydraulic pull-back rams, which exert a breaking pressure of 5.5 tons. Variable pressure control is provided both on the pump and on the press, and the range is from 20 to 60 tons clamping pressure and 5 to 15 tons transfer pressure, thus giving a wide range of utility to the press.

Mould Polishing with Diamond Paste

By PAUL GRODZINSKI, A.M.I.Mech.E.

DIAMOND dust is being used on an increasing scale as a means of perfecting the finish on moulds. The diamond is a natural abrasive of a high abrading effect, which as regards hardened steel is of the order of 25 : 1 to 50 : 1, compared with aluminium oxide, and 17 : 1 to 33 : 1 compared with silicon carbide and boron carbide. Actually the use of diamond dust has been known for longer than the two last-mentioned abrasives, but was assumed to scratch hardened steel and to leave abrasive grains embedded. This may have been the case when diamond dust was not so closely graded as it is to-day.

In use as a polishing medium, the diamond powder is mixed with oil or vaseline in such a way that it is held in suspension. To avoid the intermittent mixing of small quantities, collapsible tubes and syringes are now used for dispensing small quantities of ready-made paste, thus making the most economical use of diamond. Further, the paste consists of a mixture of chemicals which keep the diamond powder well distributed and so avoids any danger of settling out.

Fig. 1 shows the simple outfit for applying the diamond polishing technique to moulds. In the background are three applicator guns containing the different grades of diamond polishing paste, for instance, 4-8 micron size for roughing, 2-6 micron size for polishing, and 0-2 micron size for finishing. The paste is applied only to the tool surface in very small quantities. The surface to be treated may be lubricated with a fluid oil by the atomizer (also seen in the background). In front of this is a wooden holder containing felt bobs, mounted brushes, and mounted felt wheels of various types and shapes. For hand-rubbing and cleaning, absorbent cotton wool is used; various wooden laps of box-wood, orange-wood, maple, balsa, and pine in different shapes serve for applying the paste to the die cavities. Laminated plastic lapping sticks (seen on right-hand side) are also usefully employed in the workshop; these are of round, square, rectangular or other cross-section. In addition, the use of solid and expanding laps of various metals such as cast iron, steel, copper, bronze, etc., is recommended.

The handpiece of a flexible shaft rotating at 3,000 to 15,000 r.p.m., or a small, high-speed hand motor, are recommended for the polishing operation. To relieve handwork, reciprocating tools on flexible shafts have proved useful.

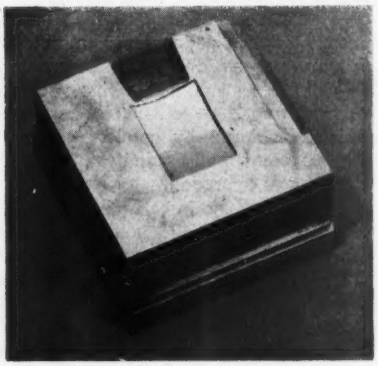


Fig. 4.—Mould for plastics magnifying lens diamond polished to perfect finish.

Fig. 1 (right).—The equipment necessary for polishing plastics moulds by aid of diamond powder paste.

Courtesy, Engis Equipment Co., Chicago, U.S.A.

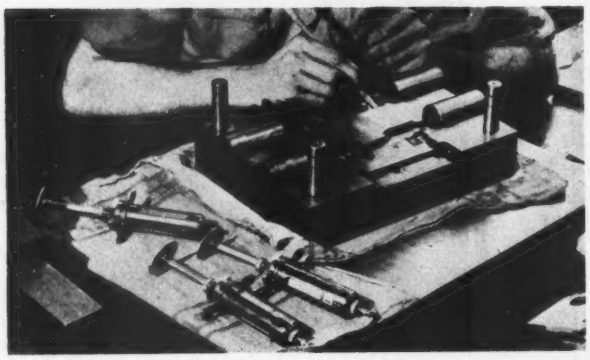


Fig. 2 (left).—Using a diamond paste prepared wooden lap for detailed work.

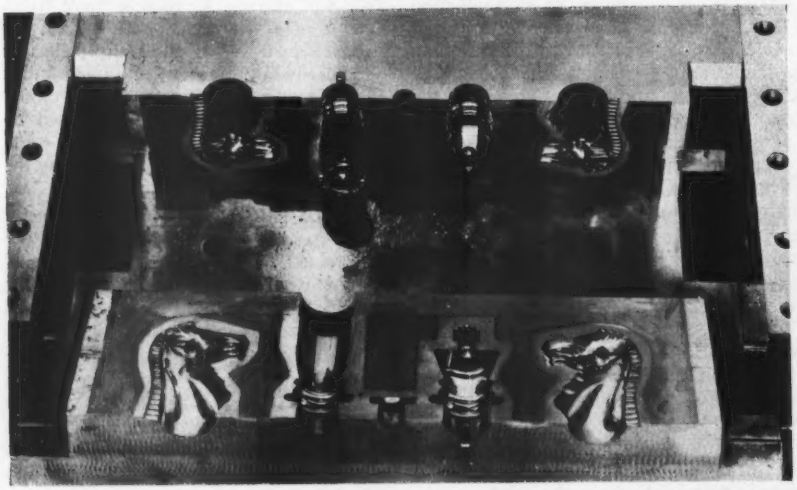


Fig. 3.—Mould for chessmen, showing perfect lustre of polished cavities.

Successful Designing for Plastics Moulding—XVIII

By W. M. HALLIDAY

In the preceding article of this series considerable attention was devoted to the application of ribs to a moulded plastics component. The various requirements in mould design and construction were noted, and numerous valuable practical advantages obtainable by the use of ribs were fully explained. The value, application and design of beadings, fillets, flutes, matting and knurling is dealt with in the present instalment

GENERALLY, rib features of the kind already illustrated and described in this series of articles will materially assist the mould designer and engineer to obtain a more satisfactory component, by affording a simple yet inexpensive means for increasing strength and rigidity. By their use, slender or relatively weak and unsupported cored-out wall sections may be supported or stiffened in such a manner as to render them less liable to warpage and distortion.

With the judicious distribution of ribs of the correct design form, the ejection of the component may be facilitated, and this critical operation safely accomplished without delay or inflicting distortion or injury upon the part. The correct use of these features will also often lead to considerable savings in actual moulding material, because it will not be necessary to thicken up the walls generally, as would otherwise be the case if ribs were not employed.

Ribs tend to reduce or prevent undesirable stressing at critical points, thus obviating the tendency towards cracking, or serious loss of shape and size.

Ribs also help to radiate mould heat more uniformly over the important cavity areas, thereby assisting to eliminate unequalized shrinkage of the part and the resultant distortion of slender walls.

They also enable the mould engineer to exert a better control over the direction of material flow in the mould cavity. This will be especially important when using injection moulds where the material is very often injected in almost a fluid state.

Beadings

Very closely allied to the rib is the similar element known as the beading. Essentially this commonly used design feature will act very much like the rib; in many instances one may be used in place of the other with equal facility and success.

The beading, however, has certain particular applications and special uses which cannot be fulfilled by the rib, i.e., it is very extensively employed as a means for improving the appearance of a finished component, and to enhance some external surface of the part. Beadings are generally situated upon some outside and visible surface or edge of the component, whereas ribs are usually located within some cored opening of the component, and thus will not be in sight when the piece is normally engaged under service conditions.

Beadings are, of course, widely adopted as a means of both improving appearance and strengthening certain portions of the component wall. For example, where the wall of a moulding has to be cored out to such a degree as will leave the remaining section weak and liable to deflect under load, a beading often of very small size may be disposed around the external edges of the cored opening. Instances arise with such corings where it is not practicable to embody ribs on the interior walls, and thus beadings may offer the only practical means for strengthening such parts.

Beadings are also introduced into a component design to relieve or "break" large flat surface areas, which otherwise would be uninteresting in appearance value.

Yet another valuable use for beadings is to facilitate or simplify trimming operations on the component after leaving the mould when parting-line flash has to be removed. This will be accomplished by providing and locating the bead so that it will lie around the component coincident with the mould block parting plane, and thus along the line of greatest flash.

Such a bead may be positioned so that the flash would occur either at one edge, or at the crest thereof, rendering its removal much simpler and safer. Where straight, plain flat surfaces have to be trimmed for parting-line surface flash, there will always be some danger of accidentally inserting the component slightly out of line with the die, and so shearing into the highly polished plain surface at one side of the component, whose appearance would thus be completely marred.

By having a beading of only a very small height at the parting line around the component, the remaining flat wall surfaces will be well clear of the cutting edges of the trimming or shearing die, so obviating the kind of damage mentioned above.

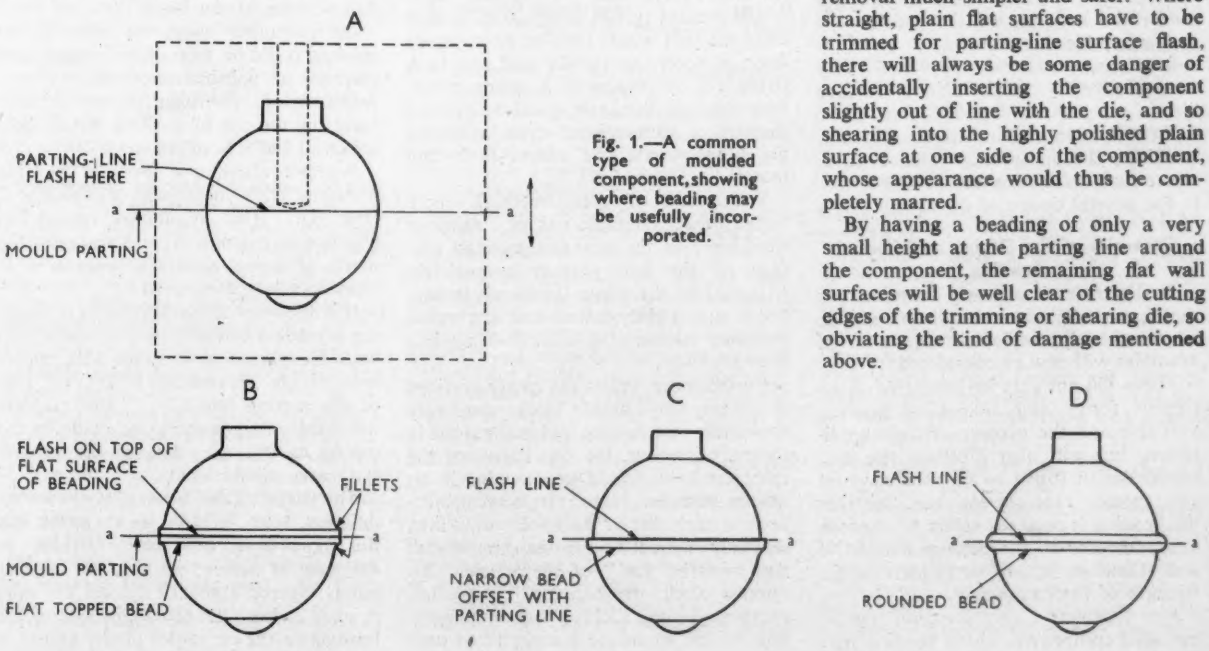


Fig. 1.—A common type of moulded component, showing where beading may be usefully incorporated.

The use of beadings may also prove extremely helpful to the mould designer by allowing him very readily to ensure that the solidified component will always adhere to one mould block, usually the movable member. Whilst this need often arises with the use of compression moulds, it is of critical importance generally with injection-type moulds, since the ejector mechanism has to be installed on the movable block, and therefore the component must be drawn out of any cavity portion in the stationary block, when the tool is opened. Failure, or difficulties in this respect, may lead to serious troubles when ejecting the component. Externally located beadings can also sometimes be used advantageously, where, because of the complex configuration, or unusual shape of the article, ribs cannot be employed on the internal surfaces.

In some cases difficulties arise when machining rib channels or cavities in the mould. These may occasionally be of such a magnitude as to lead the designer to adopt beadings at other suitable points in place of the proposed ribs.

Beadings are also employed to improve the handling qualities of a component, for example, numerous types of domestic ware, and containers, which have to be fitted with screw-on or tight-fitting sealing covers and caps. With such articles, especially if of plain cylindrical tubular shape, it will be highly desirable to break the "smooth," round external surfaces of both container and cover by means of shallow beadings, steps or grooves (i.e., reverse beadings) so that the user may obtain a smarter grip of both members.

In this same connection headings are often employed to remove sharp edges and corners which otherwise would render the handling of the article very uncomfortable.

Beadings, too, can be used very successfully to mask minor surface blemishes, such as "sinks," flow lines, slight distortion and similar irregularities impairing the appearance value in cases where such defects are unavoidable owing to the general design of the article.

Examples of the Design and Use of Beading

To illustrate more clearly the numerous useful ways in which beadings may be advantageously employed, a number of examples will now be considered.

These will not only be indicative of the various forms and shapes of beading available and the manner of their application, but will also illustrate the preferred design forms to be used to meet any specific requirement, viz., whether the beading is required solely to improve appearance or as a combined decorative and utilitarian feature, or to increase the strength of the component.

Fig. 1 depicts a very common type of moulded component where beading may often be usefully incorporated. This kind of article will usually be made by compression using a thermo-setting material.

The component A (Fig. 1) is actually a spherical knob having a short, hollow cylindrical boss portion formed integrally at one side. This boss extension is to be cored out for a fixing hole by means of which the knob may be affixed to a handle, rod, etc.

To produce such a knob will require the mould having its main parting plane located across the diameter of the part at right-angles to the axis of the cored hole in the boss, such a parting being denoted by line a—a. The respective mould blocks are shown in light broken lines, and the direction of their normal parting movement is indicated by the arrow at the right.

The upper mould block is the movable member and contains a cavity exactly one-half of the spherical shape of the knob, together with the cavity for the boss extension. This member also carries the stationary core plug for hollowing out this boss. The ejector plug or other mechanism will also be mounted within this moving block.

The lower (fixed) block will contain only one-half of the spherical cavity formation, disposed so as to match up exactly around its periphery with the cavity formation contained in the upper mould block.

Thus a knob of the design shown would be produced with a flashing along line a—a, extending completely round the maximum diameter of the part as shown. No beading is employed with this design and, therefore, the following objections could be expected in respect of the finished component.

Removal of the parting-line flash would present certain practical difficulties since the part would have to be mounted upon a revolving spindle and the flash pared off by means of a sharp cutter. Alternatively, the knob could be pressed through a conventional type trimming die to shear off the excess flash and material.

With each of these methods there would be considerable risk of cutting or shearing into the smooth, polished surface of the ball portion immediately adjacent to the flash line, and in any event, an unsightly scar or marking would probably remain after such flashings had been removed.

Furthermore, unless the cavity portions in the respective mould blocks were very accurately matched up and maintained in correct alignment, the two halves of the spherical knob would be moulded in an off-set manner. The resulting projections at each side of the knob would then seriously detract from the appearance and smooth "feel" of the article. To remove such overhanging projections, etc., would entail a heavy trimming operation, which would be accomplished only at the risk of destroying or impairing the true spherical shape of the moulding.

The much-improved design shown at B (Fig. 1) is attained very simply by the introduction of a small beading at this critical parting-line point, and the use of this will materially diminish the undesirable feature observed with example A.

This modified knob component would, of course, be produced in the mould in exactly the same way as with the previous example, the only alteration to the mould being the provision of an enlargement of each cavity portion in the respective blocks.

The diameter of each cavity would be enlarged at the parting-line surface of the block, making these portions exactly the same outside diameter and depth, so that one-half of the width of the beading would be formed in each block. The mould parting line a—a would thus lie around the centre of the flat-topped beading, as shown in the diagram.

The flash formed during moulding would occur along this same line (see heavy black line), and so would be capable of being easily removed by means of an ordinary type of punch-die, plate-shearing or trimming tool.

It should be specially noted that each side of this bead is blended to the curvature of the spherical knob by a small-radius fillet. Such a provision will enhance the appearance of the part. If desired, the sharp corners of the bead at each side should be gently broken either by leaving a small radius in the mould cavity itself, or at a later polishing and buffing stage. This would make the knob more comfortable to grasp during use. To a useful degree, any scar resulting from the trimming of the parting-line flash will be masked by the flat surfaces of the bead.

On the other hand, the crest of the beading could be more heavily machined, sheared, or polished to produce a perfectly smooth, unbroken surface, without incurring the risk of spoiling the polished spherical surfaces of the knob.

Another alternative form of beading the same knob component is shown at C (Fig. 1). This is almost equally as effective as example B, and possesses the merit of being even less expensive to reproduce into the mould.

It will be noted that this form of beading is made much narrower in width than with the preceding example and, moreover, it is located only at one side of the parting line a—a. This requires only one enlargement to be made to the mould cavity, viz., that in the (lower) stationary mould block.

The shape of this beading is somewhat different, too. It is flat on the crest, but this portion is not made parallel in diameter as before; instead, the crest is amply tapered about 10 degrees per side. A small radius fillet blends the side of the beading to the curvature of the knob.

Any flash occurring during moulding will thus be situated along the sharp top edge of the beading, and it would be preferable to remove this by means of a slightly concave form-cutting tool fed into the knob in such a manner as to remove the sharp corner and flash at the top edge of the bead.

One great advantage possessed by this form of beading is that any slight sideways misalignment between the cavity portions in the respective mould blocks would not be plainly visible on the finished moulding and, moreover, the feel of the knob would not be impaired by off-setting the cavity portions.

The design D (Fig. 1) shows what is, perhaps, the best style and shape of beading to be employed with such a knob component to achieve the maximum appearance and decorative values.

In this case the bead is made with a rounded crest, which may be semi-circular as illustrated, or slightly less than that shape, as desired. The sides of the beading are blended to the general curved surface of the knob by small fillets as before.

The mould construction and cavity lay-out to produce this style of beaded knob will be exactly as with the previous examples, the only difference being that of machining the cavity enlargements to the quarter-circular shape indicated. The beading is disposed on the part to bring the parting line a—a and any flash likely to occur there exactly on the centre line.

In this present diagram the beading is shown in rather a more pronounced form than would be necessary with an actual moulding, in order to illustrate clearly the specific shape adopted.

The task of removing flash from such a beading would be equally simple, and would offer greater freedom to remove completely any unsightly scars or markings without in any way destroying the general shape and appearance of the knob. A rounded beading of this kind will be the easiest to handle by a user. It will also be appreciated that with all these examples the beading is employed solely to improve the appearance, and in no wise will add to the strength of the component.

To be continued

PATENT REVIEW

The following abstracts have been made from specifications at the Patent Office, with the permission of the Controller of H.M. Stationery Office. Complete specifications can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 2/- each.

B.P. 644,855. Appl. 28.8.46. Conv. (France) 15.5.40. Acc. 18.10.50.

Manufacture of a plastic material to be used as substitute for natural leather and material obtained by this method. J. Seraphim.

Method of treating leather scrap with rubber latex containing a small amount of casein, sulphate of alumina, sodium hyposulphite, oxalic acid and ammonia. The mixture is kneaded, dried and subsequently vulcanized to form an "artificial hide."

B.P. 644,856. Appl. 28.8.46 Conv. (France) 28.10.44. Acc. 18.10.50.

Manufacture of artificial leather or hide. J. Seraphim. See also B.P. 644,855.

Manufacture of leather substitute by impregnating a fibrous mass with a coating of the following composition:—Urea, gluten or casein, cellulose xanthate, ethenoid resin, plasticizer, and water. The products can be used for shoe soles and similar applications.

B.P. 644,877. Appl. 12.8.47. Acc. 18.10.50.

Styrene copolymers. L. W. Coveney, S. L. M. Saunders, D. Schiller. To: Pinchin Johnson and Co.

B.P. 644,894. Appl. 29.12.47. Conv. (Germany) 2.7.43. Acc. 18.10.50.

Manufacture of artificial resins. Spolek Pro Chemickou A Hutni Vyrobu N.P.

Artificial resins based on esterifying cyclohexanediol—1 : 2 with a polybasic acid or its anhydide in the presence of a solvent and/or a resin acid or a fatty acid. Applications. Adhesives, insulating materials, lacquers and coating materials.

B.P. 644,952. Appl. 24.6.48. Acc. 18.10.50.

Making mould dies. D. H. Corbin. To: General Motors, Ltd.

Method of making intricate moulds for injection moulding purposes, consists of forming and shaping accurately a plurality of separate parts, assembling them in correct relation and brazing them together.

B.P. 645,023. Appl. 11.11.47. Conv. (Switzerland) 18.11.46. Acc. 25.10.50.

New stable emulsions of artificial resins and processes for making same. To: Ciba, Ltd.

Water-insoluble heat hardenable condensates of formaldehyde in combination with an aminoplast, used as binding agents, adhesives, impregnants, etc.

B.P. 645,033. Appl. 13.2.48. Acc. 25.10.50.

Solutions of nylon. R. Hill, R. G. A. New, S. M. Todd. To: I.C.I., Ltd.

Organic compounds such as maleic, succinic, phthalic anhydride are suggested for dissolving nylon in the production of solutions containing relatively high proportions of nylon. The solutions can be poured for the manufacture of shaped articles.

B.P. 645,034. Appl. 16.2.48. Conv. (U.S.A.) 5.12.46. Acc. 25.10.50.

Emulsion polymerization of styrene. H. F. Park, C. H. Basdekis, R. I. Dunlap, Jr. To: Monsanto Chemical Co. (See also 645,035.)

B.P. 645,065. Appl. 22.9.47. Conv. (U.S.A.) 10.10.46. Acc. 25.10.50.

Polymerizable pentachlorostyrene, its polymers and copolymers. J. W. Churchill and J. J. Hayes. To: Mathieson Alkali Works.

B.P. 645,067. Appl. 9.12.47. Conv. (France) 3.3.47. Acc. 25.10.50.

Production of polymeric compounds. To: Soc. des Usines Chimques Rhone-Poulenc.

Polymerization of vinyl-allyl ether in solution at a temperature below 38 degrees C. Polymerization catalysts such as iodine, metal halides, in particular aluminium chloride, stannic chloride, ferric chloride, etc., are used in the process.

B.P. 645,088. Appl. 16.4.48. Acc. 25.10.50.

Emulsion of ethylene polymers and interpolymers. L. Seed. To: I.C.I., Ltd.

Aqueous emulsions of solid ethylene polymers and interpolymers are obtained by polymerizing ethylene at a high temperature and pressure in the presence of water, an organic sulphonic acid and a soluble salt of a carboxylic acid polymer.

B.P. 645,089. Appl. 16.4.48. Conv. (U.S.A.) 5.6.47. Acc. 25.10.50.

Copolymers of styrene and acrylonitrile. To: United States Rubber Co.

B.P. 645,114. Appl. 13.8.48. Acc. 25.10.50.

Fixing of thermoplastic members to walls or other surfaces. G. Haim and H. P. Zade. To: Communications Patents, Ltd.

Method of fixing a thermoplastic lining to a metal or other surface by means of metal screws and covering the screw head by means of a cap of the same thermoplastic material. "Friction welding" is recommended to join the cap to the lining, forming a completely liquid-tight cover over the screw head.

B.P. 645,159. Appl. 8.3.48. Acc. 25.10.50.

Mechanical treatment of artificial filaments. R. Lipscomb. To: I.C.I., Ltd.

Improvements in the manufacture of tapered bristles from polymeric filaments. Extruded filament, e.g., nylon which has been drawn to a diameter of 0.012 in. is passed through a system of "nip rolls" which reduce the diameter in a predetermined manner, depending on shape and speed of the nip rolls. The filament is subsequently cut into correct lengths.

B.P. 645,197. Appl. 3.11.47. Conv. (U.S.A.) 4.11.46. Acc. 25.10.50.

Curing polyhydric alcohol-polycarboxylic acid condensation polymer compositions. To: Johnson and Johnson (Great Britain), Ltd.

Refers to production of impregnating materials based on condensation polymers mixed with 0.2 to 5 per cent. by weight of pure colloidal carbon black.

B.P. 645,203. Appl. 26.1.48. Conv. (U.S.A.) 27.3.42. Acc. 25.10.50.

Synthetic resinous products and methods of producing same. M. T. Harvey. To: Harvel Research Corp.

A resinous product is produced by reacting a mixture of furfuryl alcohol and formaldehyde under acid conditions. Products are used as binders and fillers in brake linings and clutch facings and are resistant to high temperatures and sudden changes in temperature.

B.P. 645,222. Appl. 17.3.48. Conv. (U.S.A.) 25.3.47. Acc. 25.10.50.

Dialkenyl arylphosphonates and polymers thereof. E. C. Shokal and L. N. Whitehill. To: N. V. de Bataafsche Petroleum Mij.

Refers to the production of fire-resistant allyl resins. Used in electrical equipment such as switch gear or in laminates in combination with glass cloth or other textiles.

B.P. 645,243. Appl. 2.7.48. Acc. 25.10.50.
Production of artificial monofils. E. E. Tallis. To: Courtaulds, Ltd.

Describes process for making monofilaments of fibre-forming alginates, etc. An aqueous solution of a water soluble salt of a polyuronic acid is extruded into a coagulant bath containing a metal salt. The monofil is subsequently dried at a temperature not exceeding 40 degrees C.

B.P. 645,257. Appl. 18.2.47. Conv. (U.S.A.) 28.2.41. Acc. 25.10.50.
Resinous laminates and production thereof. To: St. Regis Paper Co.

Manufacture of heat-resisting laminated plastic articles which do not blister or delaminate when subjected to temperatures of 200-350 degrees F., i.e., can be enamelled and baked in the same way as metal parts. The laminate has a surface layer which is hard and imporous owing to high resin content while the remainder of the sheet is soft and porous.

B.P. 645,275. Appl. 8.11.47. Conv. (U.S.A.) 8.11.47. Acc. 25.10.50.
Filaments of thermoplastic material and manufacture thereof. T. W. Stedman. To: The Firestone Tyre and Rubber Co.

Manufacture of filaments with diameters ranging from 0.001 in. to 0.015 in. from crystalline vinylidene chloride polymers and copolymers. The filaments are extruded in the molten condition into a large chamber in which the temperature is at least 200 degrees F.; they are elongated by the tension exerted by their own weight.

B.P. 645,291. Appl. 9.3.48. Acc. 25.10.50.
Compositions containing cement and highly polymeric substances. F. Brown and W. Saul. To: Dunlop Rubber Co., Ltd.

Dispersions of high molecular weight organic polymers, e.g., polyvinyl esters of organic acids, with a new stabilizer. Improved stability is claimed for the compounds.

B.P. 645,350. Appl. 24.2.47. Conv. (U.S.A.) 2.3.46. Acc. 1.11.50.
Polymeric material and process of producing same. B. F. Goodrich Co.

B.P. 645,356. Appl. 11.7.47. Acc. 1.11.50.
Process and apparatus for shaping thermoplastic sheet material to form frames. L. J. Moncreiff.

Manufacture of spectacle frames from thermoplastic sheet material (such as cellulose acetate) by forming between heated dies a sheet of a thickness smaller than the maximum thickness of the finished article. The male and female dies are located in a press and the heated sheet material is made to flow and fill the mould under pressure. Preheating of the sheet prior to forming is recommended.

B.P. 645,370. Appl. 19.12.47. Conv. (U.S.A.) 26.3.47. Acc. 1.11.50.
Injection moulding apparatus. To: United States Rubber Co.

Special type of portable, hydraulic extrusion device which is used to inject heated plastic material into the moulds of compression moulding presses. It is claimed that very large compression mouldings, such as steering wheels, can be moulded more economically in this manner than by the conventional method of loading with a large number of pellets.

B.P. 645,392. Appl. 27.7.48. Acc. 1.11.50.
Treatment of cellulose esters to improve their resistance to degradation by sunlight and ultra-violet light. W. G. Cameron and L. F. H. Breens. To: Courtaulds, Ltd.

B.P. 645,405. Appl. 20.5.47. Conv. (Canada) 14.9.46. Acc. 1.11.50.
Polyvinyl acetate and a polymerization catalyst for use in its production. J. A. McCoubrey and M. Kiar. To: Shawinigan Chemicals, Ltd.

Manufacture of odourless and tasteless types of polyvinyl acetate of low viscosity (1.6 to 1.2 centipoises) for the purpose of chewing gum preparations, comprises the use of a polymerization catalyst containing 9 to 33 per cent. by weight of acetyl peroxide. Particular stress is laid on low acidity of the compound.

B.P. 645,406. Appl. 12.7.47. Conv. (U.S.A.) 16.7.46. Acc. 1.11.50.
Machines adapted for progressively seaming together two layers of sheet material by use of the heating effect of a high frequency electric field. G. L. Mellen. To: British United Shoe Machinery Co., Ltd.

High-frequency welding machine for plastic sheet material with discontinuous roller feed for the material to be welded, a lower fixed electrode and an upper reciprocating bar electrode. H.F. power is supplied in pulses, the pulse repetition rate being automatically increased or decreased as the rate of feed is increased or decreased by the operator. Pulses are controlled by a rotary commutator driven from the feed mechanism.

B.P. 645,625. Appl. 9.3.48. Acc. 1.11.50.
Thermoplastic flexible stripping and the method of manufacturing it. A. W. Meldrum. To: Melwood Thermoplastics, Ltd.

Manufacture of decorative plastic extrusions in the form of belts and strips with beads of undulating character incorporated at the edges of the strip. A specially shaped die is used in connection with an ordinary extruding machine to obtain this effect. The pitch of the undulations can be varied at will by changing the extrusion rate.

B.P. 645,687. Appl. 18.6.46. Conv. (U.S.A.) 19.6.45. Acc. 8.11.50.
Manufacture of containers and covers therefor. To: British Celanese, Ltd.

Deep drawing process and moulding tools for the manufacture of boxes and containers from a blank of thermoplastic sheet material, preferably cellulose acetate. The dies consist of three co-operating members which grip the blank and form it between an inner and an outer wall. A taper of 0.015 in. per inch of draw is given to the male force in order to withdraw the male easily after the moulding operation.

B.P. 645,688. Appl. 18.6.46. Conv. (U.S.A.) 19.6.45. Acc. 8.11.50.
Moulded containers. To: British Celanese, Ltd.

See also B.P. 645,687. Refers to the manufacture of beaded edges for cylindrical cellulose acetate containers and lids. The preformed body is rotated against a stationary die and the bead formed by pressing the rim down into the forming die during rotation. The forming die may be heated.

B.P. 645,712. Appl. 18.12.47. Acc. 8.11.50.
Production of elastomers of polyvinyl chloride. S. Szekely and C. A. Redfarn. To: Boothby and Thompson, Ltd.

B.P. 645,742. Appl. 15.10.48. Conv. (Spain) 15.10.47. Acc. 8.11.50.
Buckets for acids and other corrosive liquids. F. S. Zabala.

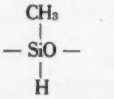
Textile reinforced bucket for the carrying of acids, moulded in one piece from rubber, synthetic rubber, etc. A spout is provided for pouring and an upper reinforced edge for carrying the bucket.

B.P. 645,761. Appl. 24.2.48. Conv. (U.S.A.) 24.2.47. Acc. 8.11.50.
Saponification of cellulose acetate textile materials. To: British Celanese, Ltd.

Treatment of cellulose acetate material with a 1 to 5 per cent. aqueous solution of sodium carbonate at 80 to 100 degrees C. in order to improve affinity for dyestuffs and facilitate dyeing of the material.

B.P. 645,768. Appl. 11.5.48. Acc. 8.11.50.
A method of rendering fabrics water-repellent. J. G. Fife. Comm. from: Dow Corning Corp.

Fabrics are wetted with an aqueous emulsion of a siloxane polymer a major proportion of the siloxane units of which are of the type



B.P. 645,907. Appl. 5.5.48. Acc. 8.11.50.
Spinning artificial filaments and bristles. J. W. Fisher, E. W. Wheatley and H. Bates. To: British Celanese, Ltd. See also B.P. 613,497.

B.P. 645,914. Appl. 28.5.48. Conv. (U.S.A.) 13.8.47. Acc. 8.11.50.
Moisture proofing heat sealing coating compositions, and articles coated therewith. To: British Cellophane, Ltd.

Moisture proofing compositions based on copolymers of ethylene and vinyl acetate in combination with coumarone indene resins and paraffin wax. Used as coatings for wrapping materials such as "Cellophane" paper, cellulose acetate film, etc.

B.P. 645,926. Appl. 30.11.48. Conv. (Switzerland) 23.12.47. Acc. 8.11.50.
Manufacture of new stable emulsions of artificial resins. To: Ciba, Ltd.

Incorporation of a "migration inhibitor" in the form of a water soluble colloidal substance into water insoluble heat hardenable condensates, e.g. polyvinyl alcohol. Application to dyeing and printing of textile materials, etc.

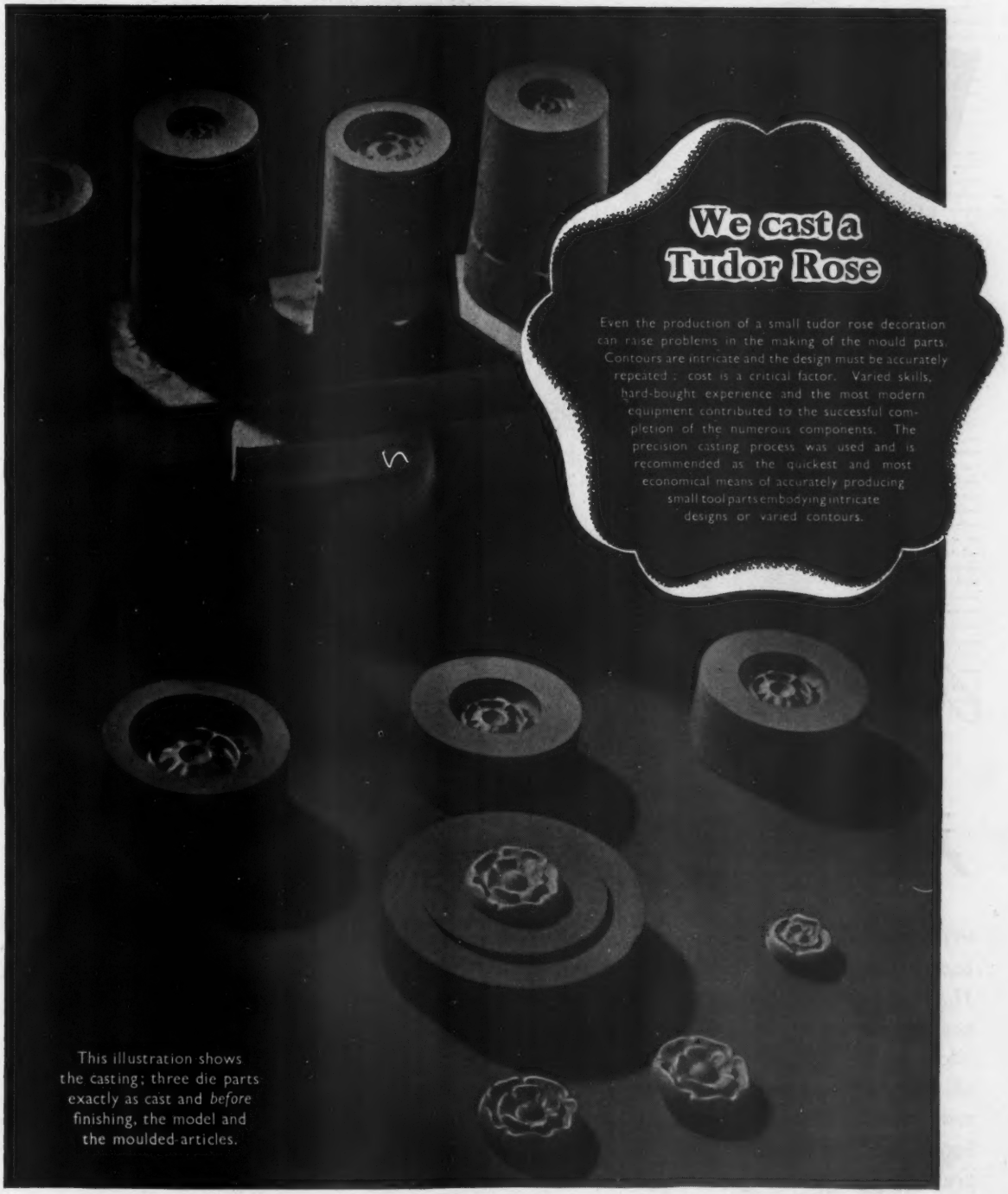
B.P. 645,971. Appl. 28.5.48. Conv. (U.S.A.) 13.8.47. Acc. 15.11.50.
Moisture proofing, heat-sealing coating compositions, and sheets and films coated therewith. To: British Cellophane, Ltd.

Coating composition for application to "Cellophane" films for moisture proofing and heat sealing purposes, consists of:—

	Preferred per cent.	Operative per cent.
Chlorinated rubber	40	25-70
Ethylene-vinyl acetate copolymer ...	40	10-55
Resin blending agent	—	0-60
Wax moisture proofing agent ...	20	1-45

B.P. 646,093. Appl. 21.4.48. Acc. 15.11.50.
Moulding Compositions. S. F. Pearce. To: Imperial Chemical Industries, Ltd.

Improvements in phenol-furfural moulding powders by the incorporation of boric acid. It is claimed that the curing speed in the mould is increased and separation of mouldings from the moulds improved. Improved electrical properties of the mouldings are also claimed.



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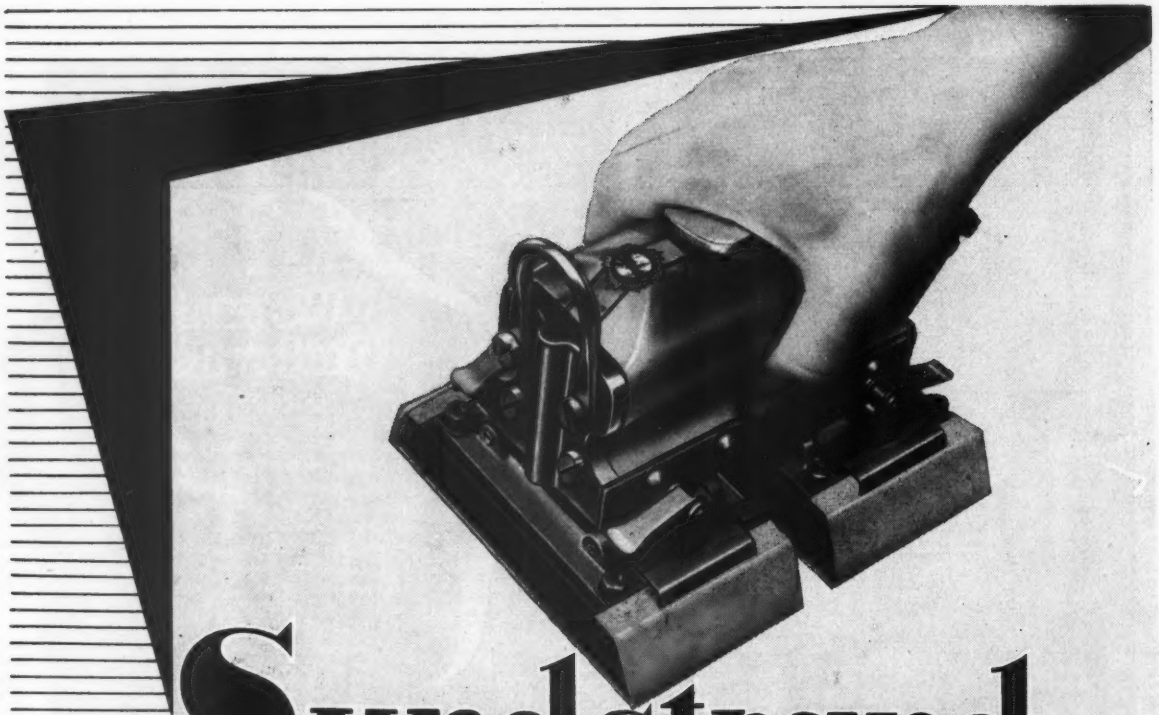

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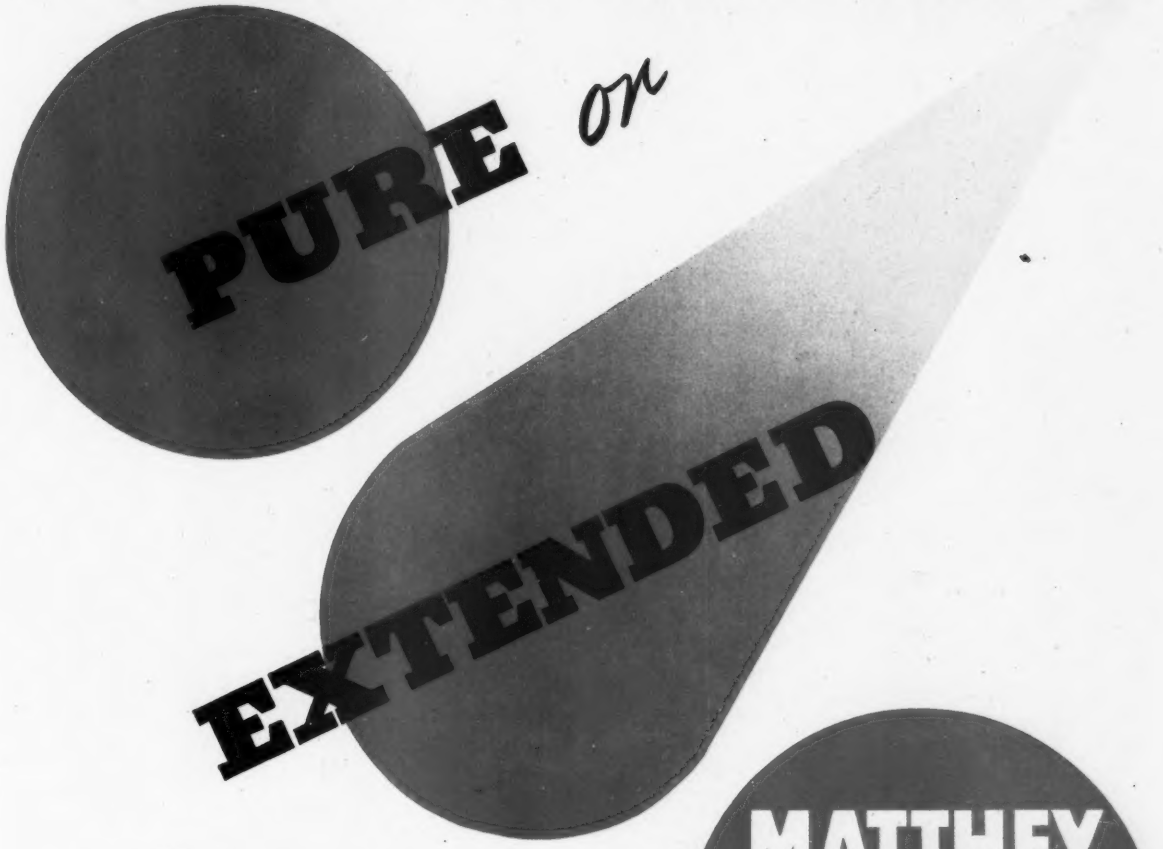

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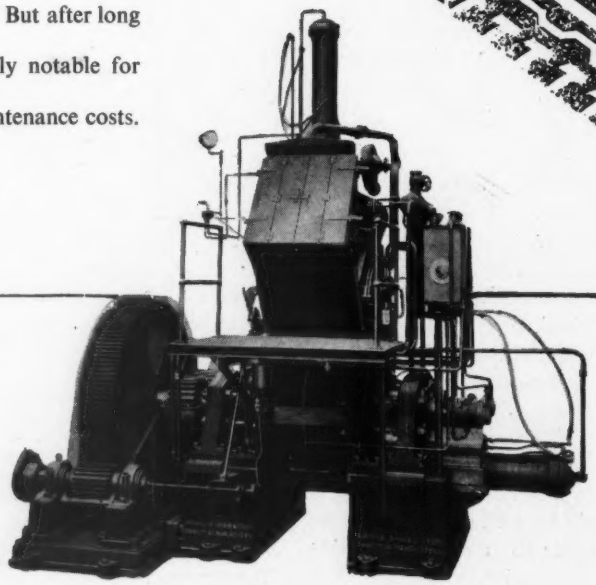

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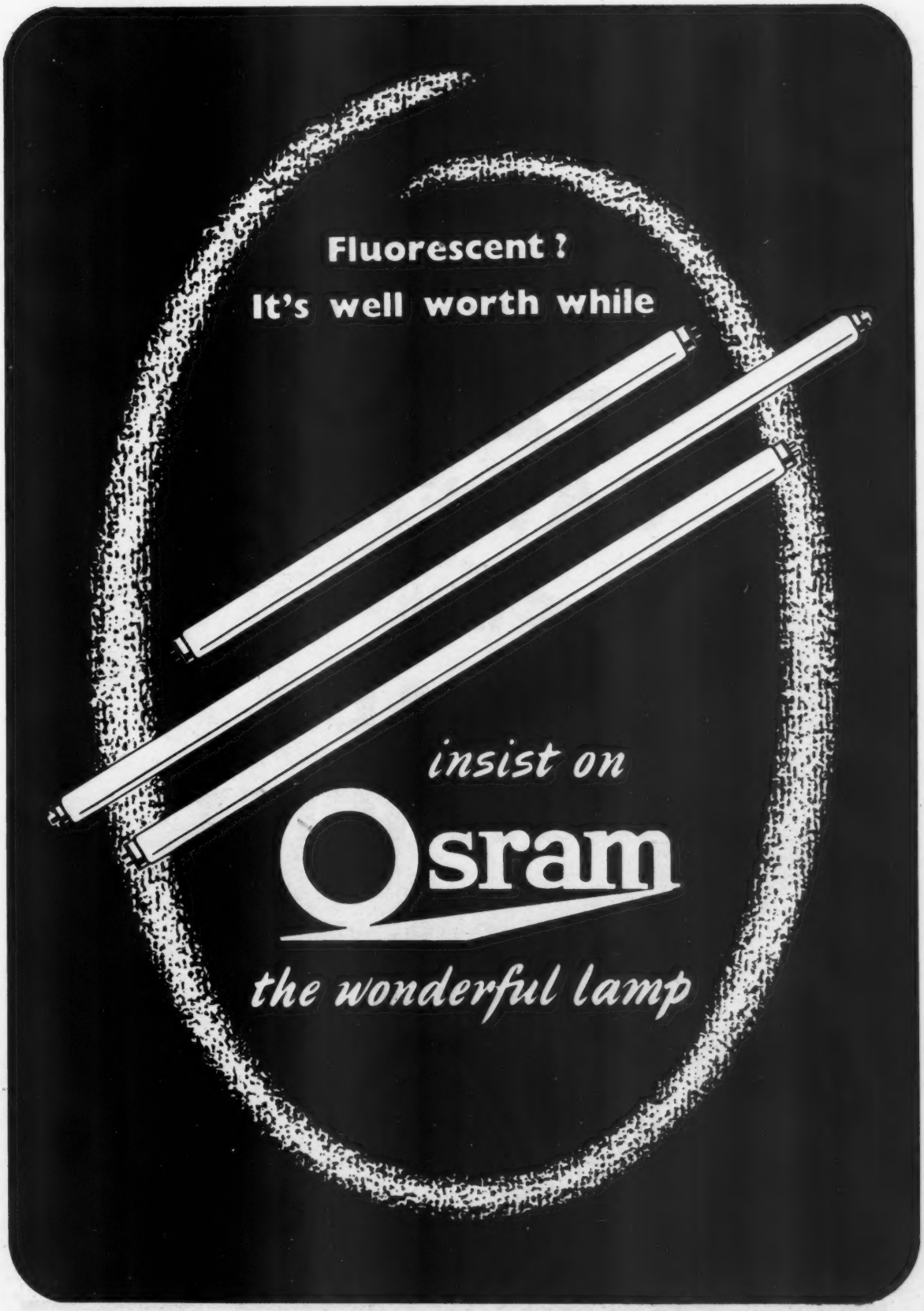

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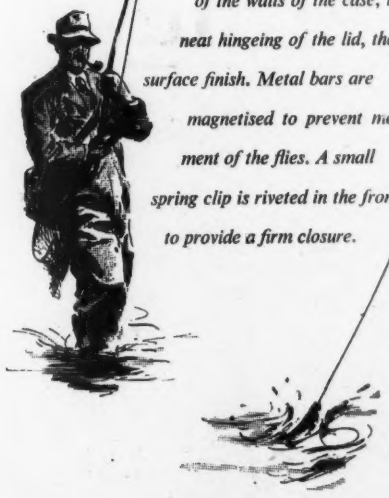

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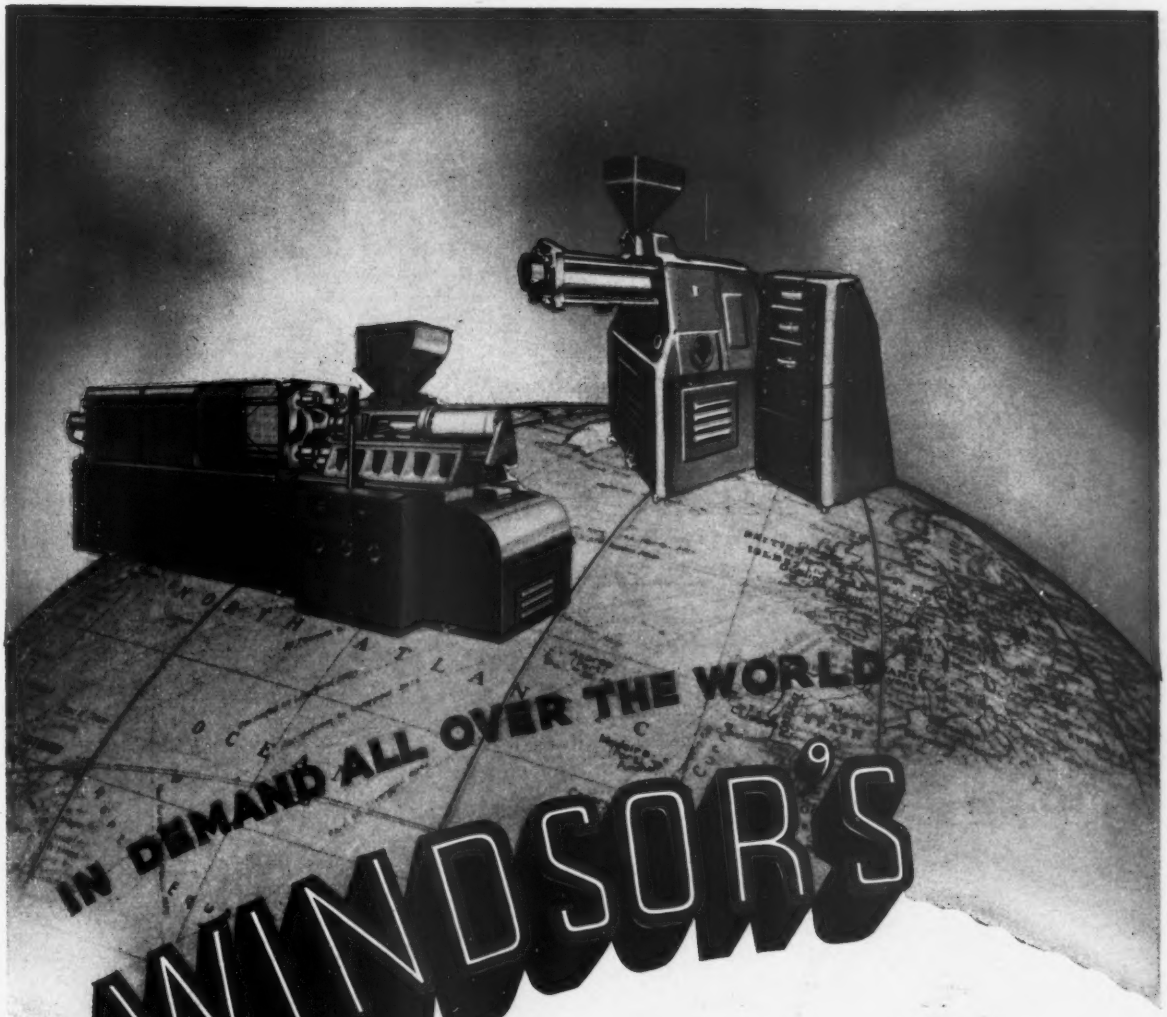

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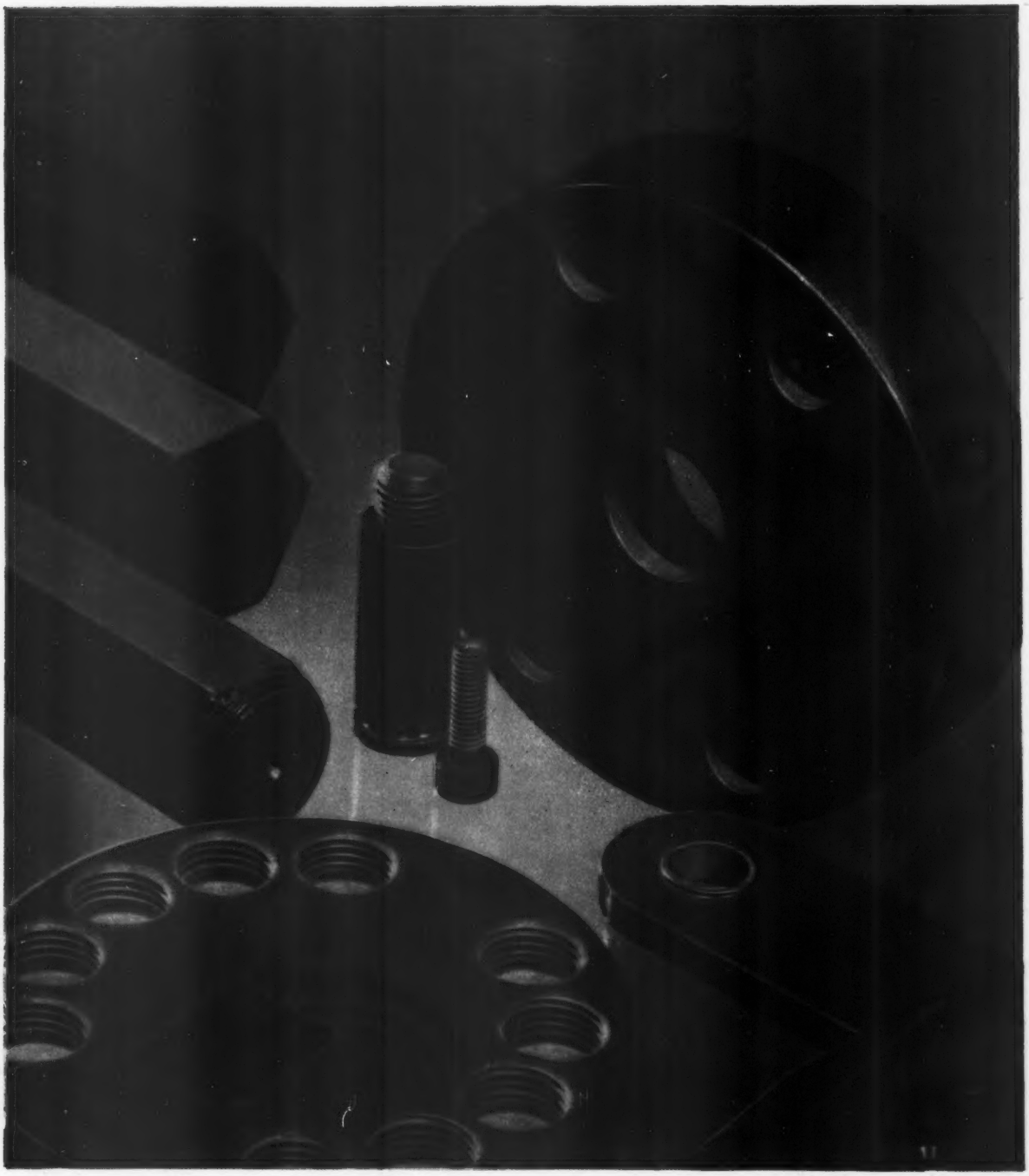

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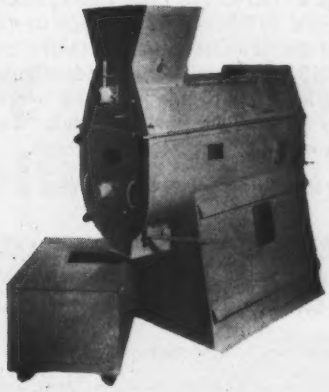

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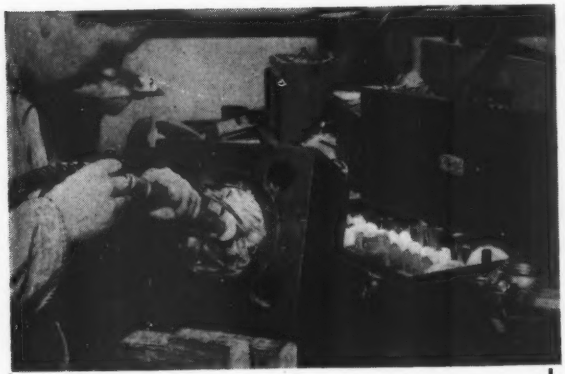

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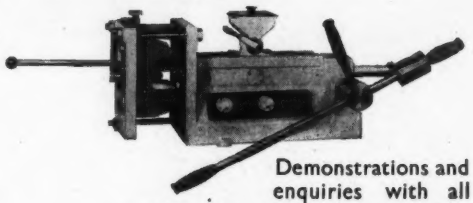

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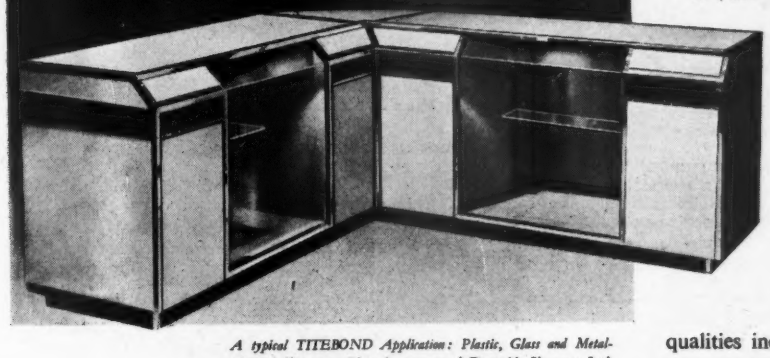

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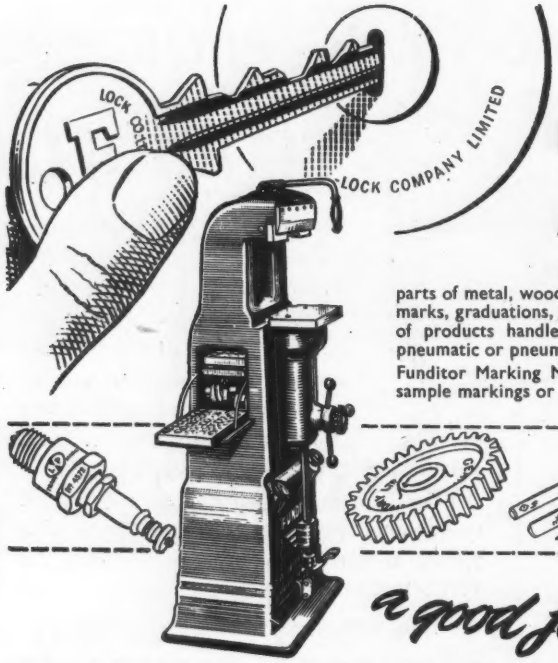

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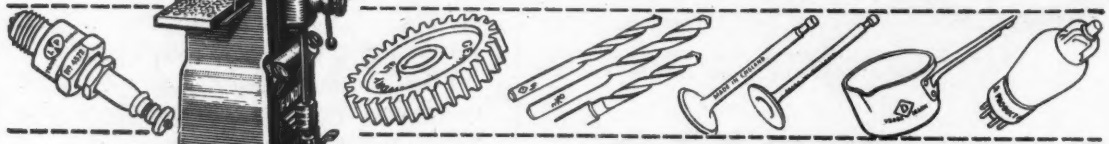

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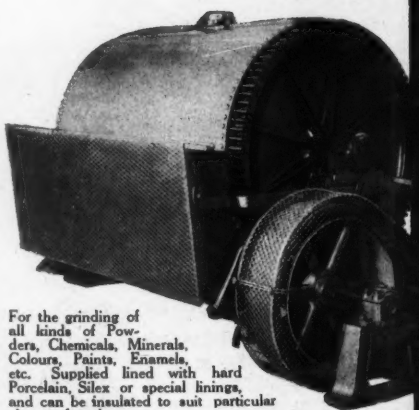

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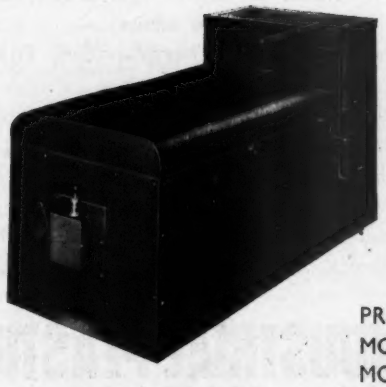

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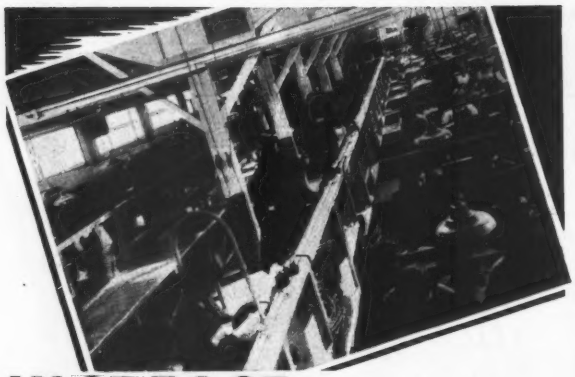

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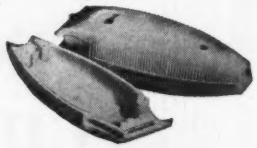

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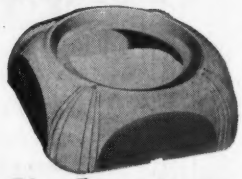

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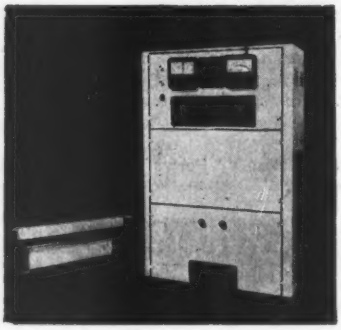

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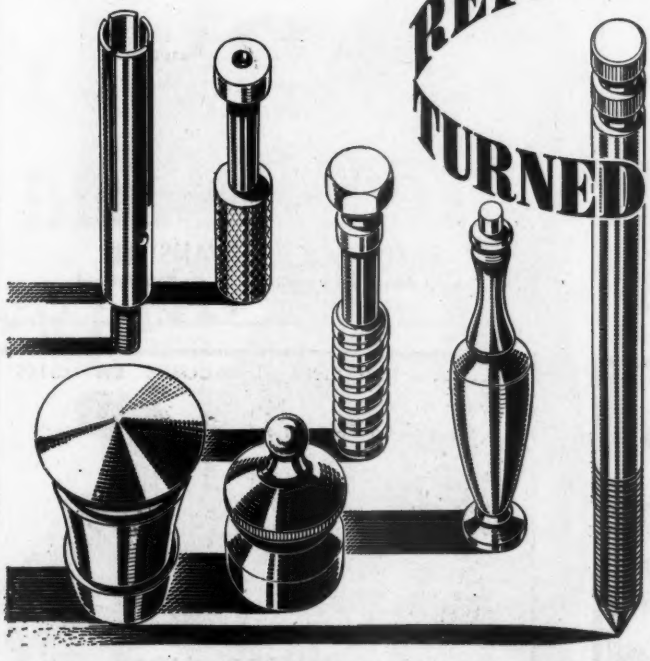

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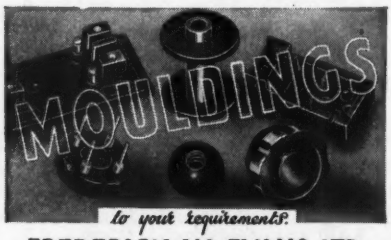

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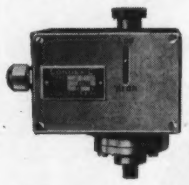

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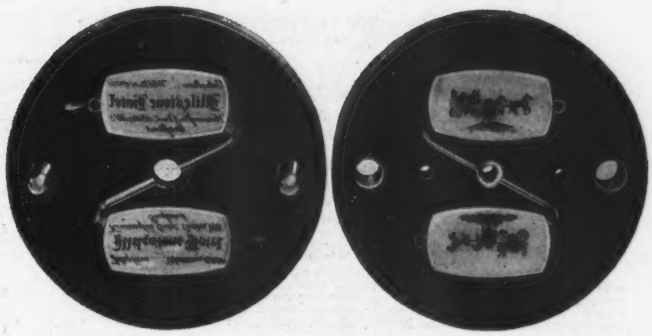

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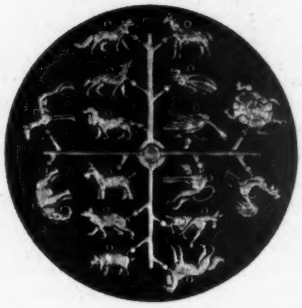

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Raw Material Available and Wanted (contd.)

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D. H. RIDOUT AND SON, LTD.
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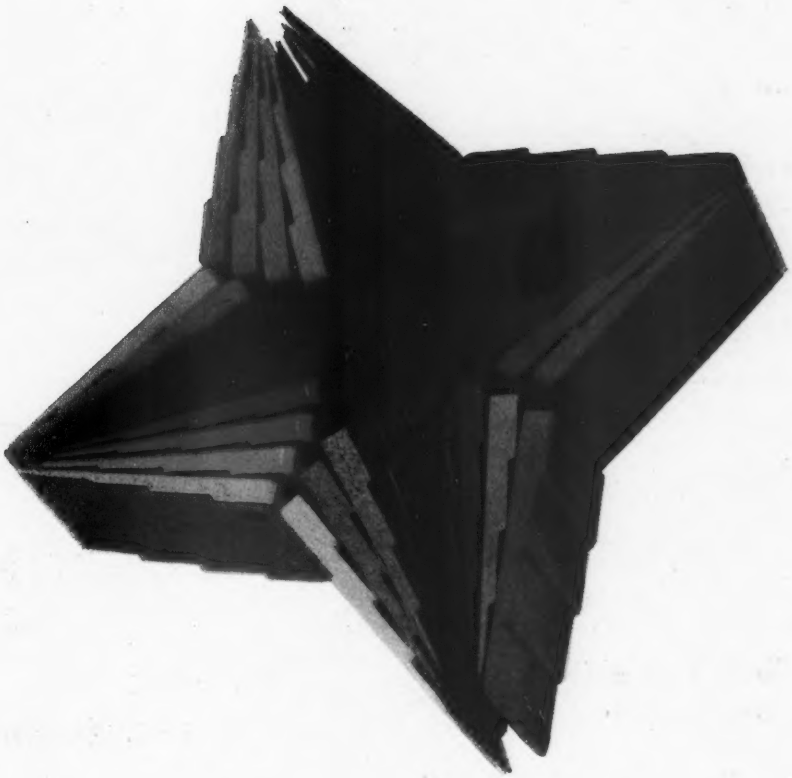

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